Intelligent Transportation Systems Strategic Plan

IBI Group

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List of Exhibits

Appendices

Terms and Acronyms

Acronym / Abbreviation	Definition / Description
APC	Automatic Passenger Counters
AFC	Automatic Fare Collection
AVA	Automatic Vehicle Annunciation
CAD/AVL	Computer Aided Dispatch / Automatic Vehicle Location
Driver Mgmt	Driver and/or workforce management software
Info Displ	Real-time information displays at stops or terminals
Info Mobile Device	Real-time information available on mobile devices (cell phones, PDA's, etc.)
IVR	Interactive Voice Response
Maint Mgmt	Maintenance management software
On-Board Cam	Security camera system on-board the vehicle
RT Web	Real-time information available on the Internet
Sec Cam	Security cameras at stops or terminals
Sec Alarm Button	Security alarm buttons at stops or terminals
Sched & Run Cut	Scheduling and runcutting software
Trip Plan	Trip planner available on the Internet
TSP	Transit Signal Priority
Yard Mgmt	Yard and/or garage management software

Executive Summary

Intelligent Transportation Systems (ITS) is the application of advanced technologies to optimize the performance of surface transportation systems. Over the past 15 years, transit operators across the country have embraced ITS applications and demonstrated benefits in terms of improved customer service and satisfaction, better on-time performance, and reduced capital and operating costs. Many transit operators in Virginia have been pioneers in the deployment of such technologies and have been independently deploying technology applications to improve operational performance and customer service. Significant additional benefits can be envisioned by coordinating and promoting this ITS activity to provide an improved return on investment, greater deployment efficiency, a higher level of functionality through system interaction and consistency of service delivery among transit operators. This plan builds on the current extensive transit ITS deployment in Virginia to outline a coordinated approach to deploying transit ITS technologies across the state.

In undertaking the project to develop this plan, DRPT has seized the opportunity to assume a lead role in this coordination effort, helping to facilitate the proliferation of interoperable systems among transit operators in the state. The plan considers the application of the key enabling transit ITS technologies which include:

- Computer aided dispatch / automatic vehicle location (CAD/AVL) and peripheral technologies such as transit signal priority to improve transit on-time performance;
- Various information systems on-board, in facilities, and through remote access (i.e. web, telephone) to improve customer awareness and accessibility;
- Passenger counters and scheduling software to improve service planning;
- Automated fare collection systems, and security surveillance systems to improve the attractiveness of transit service; and
- Maintenance management applications to improve the efficiency of fleet maintenance activity.

The adoption of these technologies provides the means to automatically monitor and report on the performance of the transit service to validate improvements, and introduce remedial measures as appropriate. A typical core technology that can provide benefits to the management and operation of a transit service as well as to its customers is the deployment of CAD/AVL to track the real-time location of the transit vehicles. Such systems enable advanced traveler information via a variety of media such as web, phone and text as well as performance monitoring and data collection for enhanced planning activity. The associated in-vehicle technology and communications can be leveraged for other security and management applications such as passenger counters and on-board cameras.

Typical deployments for bundles of ITS applications have been defined relative to the scope and scale of transit service, drawing upon knowledge of the current state of the industry. The 37 transit operators in Virginia have been surveyed with respect to their current and planned technology deployments in order to establish a baseline for each transit operator relative to typical deployments. The results of this survey demonstrate an extensive baseline of ITS deployment across the state. In general, the larger fixed route services have a higher propensity to adopt technologies. The smaller scale fixed route and demand responsive service providers exhibit a wide variation in terms of their level of technology deployment. The results of the data collection efforts are illustrated in the following table. This table identifies the categorization of each operator, and their existing or planned ITS activity over the near term (1-2 years) and mid-term (2-6 years) along with the anticipated near term ITS investment by each operator. These initiatives represent a potential level of investment in excess of $10 million over the coming 2 years.

TRANSIT OPERATOR	SERVICE TYPE: Fixed-Route: Large (300+)	Medium (100-300)	Small (<100)	Demand-Response: Large (50+)	Small (<50)	Commuter Bus	Rail	TRANSIT OPERATOR RESPONSE: Survey	Validated Form	ITS DEPLOYMENT PLANS (Within Next 6 Years): On-Board Equipment: CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	Central Systems Equipment: IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Wayside Equipment: Info Displ	Sec Cam	Sec Alarm Button	Estimated Cost for Near-Term Deployments (shading indicates estimate from project team)
Alexandria Transit Company			x					x	x	■	■				■		■		■					■				$700,000
Arlington Transit			x	x				x							▲	▲	■	▲	■	▲								$100,000
Bay Transit					x				x	■	■	▲			▲			■		■	■	■	■					$1,650,000
Blacksburg Transit			x		x			x	x							■	■								■	▲	▲	$50,000
Blackstone Area Bus			x						x																	■		$35,000
Bristol Transit			x																									-
Charlottesville Transit Service			x		x			x											■			▲		▲				$50,000
Danville Transit			x																									-
District Three Public Transit			x						x	■											■							$230,000
Fairfax County DOT (Fairfax Connector)		x						x		▲	▲	▲			▲		▲		▲		■		▲	▲	▲	▲	$200,000
Fairfax CUE			x						x		▲																	-
Farmville Area Bus			x						x						■													$84,000
Four County Transit			x		x			x	x						▲													-
Fredericksburg Regional Transit			x							■																		$375,000
Greater Lynchburg Transit Company			x		x				x	■										▲	■		■		▲			$910,000
Greater Richmond Transit Company		x		x				x	x	■			▲									■		▲		▲		$500,000
Greater Roanoke Transit Company			x		x			x		▲	▲										▲							-
Greene County Transit, Inc.					x			x	x	▲				▲		▲		▲				▲	▲					-
Hampton Roads Transit	x			x				x	x				■				■		■		■				■	■	■	$150,000
Harrisonburg			x		x			x		▲	■	■					▲	■	▲	▲				▲	▲			$340,000
JAUNT Inc.				x				x	x					■	■		▲		▲		■				▲	▲		$1,000,000
King Street Trolley			x					x																				-
Lake County Area Transit					x			x																				-
Loudoun						x		x	x			▲					▲			■	■							$150,000
Mountain Empire Older Citizens Inc.					x																							-
Petersburg Area Transit			x		x																							-
PRTC OmniRide			x		x	x		x	x	▲					■													$150,000
PRTC OmniLink			x							▲																		-
Pulaski Area Transit			x		x			x																				-
RADAR			x									■		▲	■							■						$380,000
STAR Transit			x																									-
Town of Bluefield - Graham Transit			x																									-
Town of Chincoteague							x	x	x																			-
Virginia Railway Express							x	x											■							▲		$100,000
Virginia Regional Transit			x		x			x		▲	▲	▲			▲	▲	▲	▲	▲				■	▲	▲	▲		$50,000
Williamsburg Area Transport			x						x	■	▲					▲	■		▲	▲	▲	▲		■	▲			$200,000
Winchester Transit	x			x				x	x	▲	▲	▲								■								$300,000
WMATA	x			x			x																		■			$1,800,000

LEGEND	
Existing Deployment	
Near-Term Deployment (1-2 years)	■
Mid-Term Deployment (2-6 years)	▲

The short term plans of each transit operator have been analyzed to identify opportunities for coordination to maximize the benefits that can be achieved from the technology investment. Additionally, outreach activities within this planning project have identified a number of strategic initiatives which can be employed to provide cross-cutting regional benefits and address some of the challenges to efficiently accessing the benefits of transit ITS. These measures include partnerships in specifying and procuring systems, the application of standards, the sharing of knowledge, and development of staff skill sets. Information sharing among transit operators, resource sharing, and joint procurement activities will improve the accessibility of technology, in particular for the smaller properties. While these coordinated activities can provide assistance and support to operators in deploying ITS, there is an underlying need for an internal champion that owns the process and truly understands the problem, process and product.

There are also a number of regional or state-wide initiatives which should be pursued with the cooperation of multiple transit and transportation stakeholders. These include participation in the state-wide 511 program, provision of real time traveler information at key activity centers and on priority corridors, and the creation of low cost vehicle tracking and customer information solutions. There are also opportunities for common wireless communications systems and open data access.

The resulting cross-cutting and regional initiatives that should be pursued by DRPT in the short term are summarized in the following table.

COORDINATED ITS PROGRAM SUMMARY			
Project	**Timeline**	**Partners**	**Budget**
Opportunities to Coordinate Transit Operator Projects			
On-Board Equipment Coordinated Deployments	Near-Term (1-2 years)	<u>CAD/AVL</u> Common procurement sections (small fixed-route) - District Three, Fredericksburg, Greater Lynchburg Common procurement sections (small demand-response) - Bay Transit and Williamsburg	~ $2.5 million
		<u>APC</u> Joint procurement – Alexandria and Harrisonburg	
		<u>On-Board Cameras</u> Joint procurement – Farmville and RADAR	
Central System Equipment Coordinated Deployments	Near-Term (1-2 years)	<u>Maintenance Management Systems</u> Joint procurement – Bay Transit, Fairfax Connector, GRTC, JAUNT, RADAR	~ $3.5 million

COORDINATED ITS PROGRAM SUMMARY			
Project	**Timeline**	**Partners**	**Budget**
		<u>Yard Management Systems</u> Common specification sections – Bay Transit, Virginia Regional Transit	
		<u>Scheduling and Run Cutting Software</u> Common specification sections – Bay Transit, District Three, Greater Lynchburg, Loudoun, Winchester	
		<u>Real-Time Traveler Info on Web</u> Common specification sections – Alexandria, Arlington, Blacksburg, Hampton Roads, Williamsburg	
		<u>Real-Time Traveler Info on Mobile Devices</u> Common specification sections – Alexandria, Arlington, Blacksburg, Hampton Roads, Loudoun	
Wayside Equipment Coordinated Deployments	Near-Term (1-2 years)	<u>Next Bus Arrival Display</u> Joint procurement (large fixed-route) – WMATA and Hampton Roads Joint procurement (small fixed-route) – Blacksburg and Williamsburg Open-ended procurement to allow small fixed-route operators to "piggyback" on large fixed-route operators' joint procurement contract	~ $450,000
Cross-Cutting and Research Efforts			
Statewide 511	Near-Term (1-2 years)	VDOT	$30,000 (scoping study)
Multimodal Real-Time Traveler Info for I-95 and I-395 Corridors	Near-Term for planning (1-2 years) Mid-term for deployment	VDOT, Transurban, Virginia Railway Express, PRTC	$20,000 (planning) $50,000 (deployment

COORDINATED ITS PROGRAM SUMMARY			
Project	**Timeline**	**Partners**	**Budget**
	oversight (2-6 years)		oversight)
Activity Center Traveler Information Display	Near-Term (1-2 years)	VDOT, private sector activity centers	$150,000
Low Cost Bus Location and Real-Time Traveler Information	Near-Term and Mid-Term (1-6 years)	DRPT, Blacksburg Transit	$100,000 per year
Open Data Access	Near-Term and Mid-Term (1-6 years)	DRPT, VDOT, MWCOG/RITIS, transit operators	$20,000 per year
Communications Assessment for Transit	Near-Term (1-2 years)	DRPT, consultant support, transit operators	$75,000 (research study)
Fare Integration	Ongoing	DRPT, WMATA, HRT, consultant support	$20,000 per year
Standards Working Group	Near-Term (1-2 years)	DRPT, operator stakeholders, consultant support	$50,000

This plan should be kept evergreen through updates on an annual basis to monitor progress and assess performance against the plan. Such updates should be incorporated into the annual Transit Development Plan activities to allow continued coordination and proactive budget allocation for promotion of coordinated ITS deployment across the state. Additionally, the workshops and outreach meetings undertaken throughout the development of this plan identified a greater need for information sharing between transit operators across the state. To address these needs, this plan proposes an annual transit ITS workshop, the setting up of an online Virginia Transit ITS Forum and ongoing coordination of peer review activities. Where possible, these outreach activities should be pursued in partnership with ITS Virginia, the established state-wide organization that promotes the deployment of ITS.

1 Background

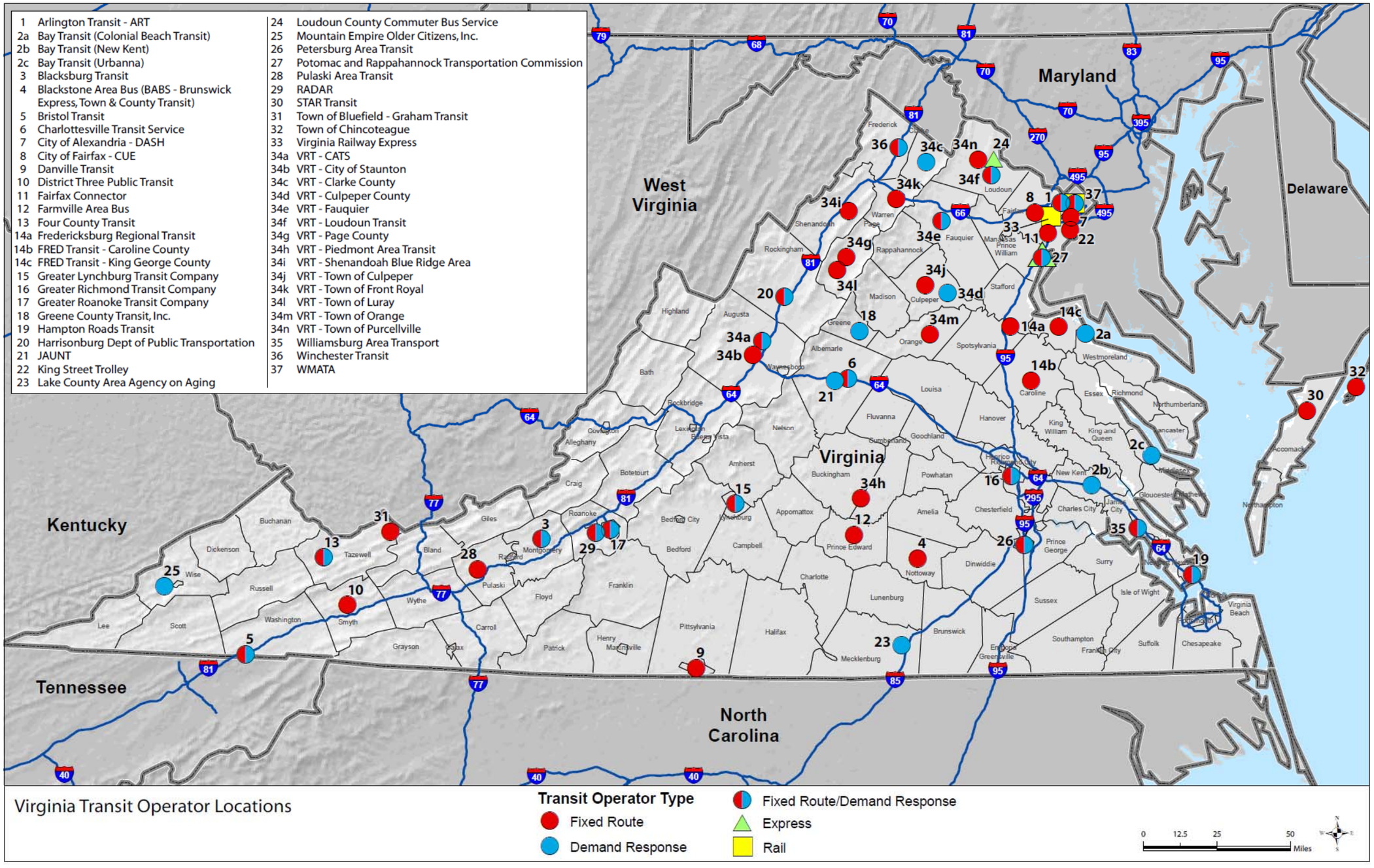
Intelligent Transportation Systems (ITS) is the application of advanced communication and information technologies and management strategies to optimize the performance of surface transportation systems. For over 15 years, transit operators across the country have been deploying ITS applications to improve on-time performance, route-planning, and customer service, while mitigating the need for investment in new infrastructure and vehicles/rolling stock, and reducing operating costs. The ITS benefits database http://www.benefitcost.its.dot.gov hosted by the U.S. DOT Research and Innovative Technology Administration (RITA) includes numerous case studies documenting increased customer satisfaction and transit system performance, and/or decreased operating and capital costs associated with the application of transit ITS.

Transit operators across Virginia are continuing to deploy a variety of technologies for improving transit service planning and operations. Virginia has been at the forefront of the industry with a number of significant ITS projects including:

- Regional participation in the WMATA SmarTrip program;
- Deployment of an automatic route deviation system on PRTC;
- Development of an open source low-cost arrival prediction system; and
- Commitment for State-wide involvement in the Google Transit application.

Operators using ITS range from small rural services, to large urban operators (see Exhibit 1-1 for a map of transit operators across the State). Several transit operators have also developed their own ITS plans based on assessment of their local needs. However, to date, ITS planning and deployment has been a loosely coordinated process driven primarily by the local interest of a technology champion or an emerging local need, rather than a cooperatively planned deployment that focuses on the comparative needs between providers across the State. A program of ad-hoc deployment can lead to stovepipe systems, less competitive procurements, varying technology standards and difficulties in data sharing between transit operators or even within the same transit operator.

Exhibit 1-1: Map of Transit Operator Locations



Regardless of the localized nature of some programs, the deployment of transit ITS in Virginia to-date has had many successes, and ongoing activities look to add to these. However, a coordinated approach based on customer needs that could help DRPT develop a roadmap for ITS deployment across the state does not exist. Without this coordinated effort, significant effort would be required to identify the best allocation of any ITS funding that becomes available.

Technology deployment also plays an important role in the Commonwealth's transportation vision laid out in VTRANS 2025. The VTRANS 2025 plan identifies that Virginians envision a multimodal transportation system that is safe, strategic and seamless. The second of the six major goals outlined in this plan states: "Preserve and manage the existing transportation system through technology and more efficient operations."

This clearly provides a state-wide mandate for the deployment of ITS technologies and lays the path for coordination of projects to achieve greater efficiencies.

VTRANS Goal:

"Preserve and manage the existing transportation system through technology and more efficient operations"

Provides a clear mandate for deployment and coordination of transit ITS technologies.

DRPT's mission to improve the mobility of people and goods while expanding transportation choices in the Commonwealth and stated goals for achieving this mission also support development of a coordinated ITS program. Specifically, a coordinated ITS program addresses the goals of "Seek the highest possible return on investment to maximize limited funding" and "Implement best practice management tools and techniques to improve customer service and accountability".

A deployment plan based on objective criteria, and customer and transit operator needs therefore meets Commonwealth and DRPT goals while providing a variety of benefits, including:

- Improved program coordination;
- Greater return from ongoing and new deployments;
- Cost savings through economies of scale in system design and procurement;
- Enhanced interaction between transit operators and systems;
- Phased technology roll-outs that allow for optimization of investments and returns; and
- Greater consistency in the levels and types of service provided across transit operators.

This ITS Plan seeks to:

- Identify transit ITS technologies and their applicability to Virginia transit agencies;
- Provide an evolving map of the deployment of transit ITS in Virginia; and
- Identify increased efficiencies, cost savings and greater benefits through increased coordination of transit ITS deployment in Virginia

2 Planning Process

To develop this ITS Strategic Plan, a series of tasks were conducted. These tasks are described in the following paragraphs as follows:

- **Statewide Transit System Assessment** - In order to understand the current state of ITS deployments and transit operator needs, a survey was conducted as the primary means of data gathering. Two regional meetings were held to discuss the goals of the plan and to provide a summary of current transit technologies. The survey was web-based and circulated to all transit operators across the state. The first part of the survey was an assessment of current ITS deployments of the transit operator and future plans for other ITS deployments. The second part of the survey focused more on free form responses regarding transit operator needs, challenges, and lessons learned. A total of 24 transit operators responded to the survey.

- **Technology Assessment -** A Technology Assessment document was drafted to provide a high-level description of ITS applications for public transit. This document was intended to provide background material to inform Virginia transit operators regarding the opportunities and benefits of ITS in improving operations, service planning and delivery.

- **Review Statewide ITS Architecture Transit Components** - The project team and regional transit operators participated in a variety of workshops to provide input to regional and statewide ITS architectures being developed by VDOT. This included attendance by DRPT and operator representatives at statewide and regional workshops. These activities sought feedback on the depiction of transit operators' ITS and its interaction with other regional and statewide systems. VDOT also met with individual transit operators where appropriate to seek their input and approval on the representation of their systems within the overall architectures.

- **Evaluation and Deployment Strategy** – A strategy was developed for the diversity of transit operators throughout Virginia. This consisted of the following tasks: Transit operators were categorized by size, existing ITS deployments and plans; technologies were chosen based on their appropriateness to transit operator categories; and opportunities for resource sharing through standards conformance and procurement processes were identified. A workshop was conducted in order to review and refine the strategy.

- **Recommend Virginia Transit ITS Strategic Plan** – The evaluation and deployment strategy was used to develop this Transit ITS Strategic Plan. This plan will note the planned projects for each transit operator within a 2-year and 6-year timeframe, and highlight the projects promoting resource sharing and cooperation among the transit operators.

3 Technology Review Summary

ITS involves an integrated application of advanced electronic and communication technologies, and management strategies designed to collect and distribute information in order to increase the safety, efficiency and customer service elements of the surface transportation system, including public transit.

Transit ITS applications may include software and hardware deployed at the transit operator's garage or administrative building, on-board transit vehicles, or on publicly accessible infrastructure (including stops, terminals, traffic intersections, etc.). The following sections present a summary of the technologies included in the review that respond to a variety of transit needs.

3.1 Transit Operations

Transit ITS applications support operations by improving schedule adherence and reducing the workload for transit controllers and operators. These applications center on a set of technologies that identify where a vehicle is, where it is supposed to be and shares this information with the central controllers/dispatchers via advanced data communications networks.

Computer-Aided Dispatch/Automatic Vehicle Location (CAD/AVL) is a computer-based vehicle tracking system that monitors the position of a transit vehicle and relays its location to a central system. Positioning information can be transmitted in near real-time using wireless communications infrastructure to provide a tracking capability for buses. Presently, the location determination technology-of-choice is GPS because of its high level of accuracy, real-time capability, flexibility in changing routes and increasingly competitive price. GPS-based tracking is a proven mechanism for accurately tracking vehicle location in the field.

Mobile Data Terminals (MDT) are on-board peripheral devices typically installed as part of a CAD/AVL system, providing vehicle operators with a limited interface to the ITS and communications networks. MDTs allow transit dispatchers to communicate with operators via text messages on a digital display, rather than by voice over radio. Information regarding real-time schedule adherence, route changes, weather, and traffic can be communicated to the operator non-verbally.

Exhibit 3-1: Mobile Data Terminal

Communications systems used for Transit ITS include:

- Private land mobile radio communications (voice and data);
- 802.11(g) Wireless Local Area Network (WLAN);
- Leased cellular data services (i.e. GPRS, EDGE, 3G, EVDO).

The most cost-effective communications solution for a given transit operator is dependent upon a number of factors, including:

- The anticipated communications loading as a function of projected future fleet size and ITS features deployed;
- The existing communications assets in the form of land mobile radio UHF or VHF frequency licenses with availability to support data and in consideration of narrowbanding requirements;
- Available multi-stakeholder communications infrastructure in the form of shared trunked radio systems or municipal wireless broadband networks which could facilitate transit needs; and

- Available commercial wireless services in the region.

The optimal solution for a given transit operator can be established based upon a comparative assessment of performance, reliability, flexibility, risks, capital cost, and operating/maintenance cost.

Transit Signal Priority (TSP) applications are often included with a CAD/AVL installation. TSP allows transit vehicles to attain better mobility at traffic signal intersections by providing expedited treatment over other vehicles.

3.2 Customer Amenities

There are various types of Transit ITS applications related to customer information, deployed independently or in conjunction with a CAD/AVL deployment, including:

- **Automatic Stop Announcements (ASA)** are pre-recorded visual and audio announcements triggered automatically by a GPS signal in advance of arrival or departure from a bus stop;

- **Next Bus Arrival Displays / Annunciation at Stations** using electronic displays (i.e. Variable Message Signs (VMS)) to provide static or real time information to the public at transit shelters, terminals or on transit vehicles. More complex information such as real-time locations and schedule information can be integrated into a multi-modal information display such as a flat panel screens deployed at major activity centers;

Exhibit 3-2: Next Bus Arrival Display

- **Real-time Information Provided Online** to customers using the internet including a variety of transit information, most commonly static information such as route maps and schedules, as well as real-time data on bus locations, schedule adherence, event data and predicted stop arrivals;

- **Real-time Information Available through Personal Communications Devices** can be made available for interested customers who have wireless handheld devices via a special website. A web-enabled device (e.g. PDA, wireless phone, Blackberry) would be required to access information in this manner;

- **Interactive Voice Response (IVR)** systems provide traveler information through a touch–tone telephone or voice recognition software. IVR systems are used to provide traveler information to users in the form of updated schedules and on-time performance;

- **Transit Trip Planner** provides an interactive service that enables the user to easily identify the best travel route via the internet, information kiosk, or telephone. Using an input form, a trip planner program will obtain the necessary trip characteristics (i.e. origin, destination, accessibility requirements, etc.) and automatically generate an itinerary for the user;

- **Parking guidance systems** utilize sensors to monitor the level of parking occupancy, and report availability to motorists over a variety of media including dynamic message signs (DMS), web, interactive voice response, etc. This type of application is applicable to transit commuter parking facilities to provide motorists with advanced notification of parking availability for planning multi-modal trips.

3.3 Service Planning

Scheduling software is typically a stand-alone product that involves several detailed analytical steps: trip building, vehicle assignments, run-cutting, and crew assignments. Specialized scheduling software can help to automate several laborious steps in order to quickly develop optimized schedules for vehicles and drivers. Scheduling software is often relied upon to feed information to other ITS applications, particularly passenger information systems such as IVR and CAD/AVL systems that measure real-time schedule adherence.

Automatic Passenger Counters (APC) are devices that count passengers automatically as they board and alight buses at each stop along a route. The benefits of APCs are a reduced cost to collect ridership information and an increased quality of the information gathered. This improved information, in turn, allows a better understanding of the transit service and can be used by planners to make services more efficient. APCs can often interface with the AVL system to provide a rich data set of passengers boarding and alighting by stop location and time of day.

3.4 Fare Collection

Automated Fare Collection facilitates collecting and processing fares for public transportation services. Users can select from a variety of fare products such as magnetic stripe cards (read-only or read-write), smart cards, or debit / credit cards when using these systems. In the past few years, much progress has been made in the implementation of automated fare collection systems and the development of standards.

Exhibit 3-3: Automated Fare Box

3.5 Security

Transit security has gained increased attention in recent years. Available features can include:

- On-board video cameras employ a combination of cameras, microphones and a Digital Video Recorder to capture both video and/or audio data for either local monitoring (for processing or direct output to the transit vehicle operator), remote monitoring (via closed circuit television transmitted via broadband technology to central control) or for local storage (e.g., in a digital

event recorder). Security features can be connected to AVL and pass on vehicle location along with the surveillance data to operations control;

Exhibit 3- 4: On-Board Security Camera System

- **CCTV at terminals or stops** allows for remote monitoring/recording of transit infrastructure and patrons;

- **Operator-activated silent alarms** draw attention to the vehicle. Combined with digital communications and AVL, alarms can automatically notify the dispatcher via the CAD system that an emergency has arisen.

3.6 Maintenance

Maintenance Management Systems (MMS) are used to improve the effectiveness and efficiency of maintenance operations and to ensure the use of more stable transit vehicles. MMS can be deployed as stand-alone systems, or integrated with the operator's AVL system to continuously monitor the status of on-board mechanical equipment and provide for real-time diagnostics. MMS systems can be used to capture data on various vehicle components such as brakes, engine, and HVAC. Other vehicle-operating conditions, such as temperatures, pressures, voltages, and fluid levels, can also be tracked by the MMS system.

3.7 Performance Measures

It is important to monitor and report the benefits provided by ITS to ensure future deployments meet expectations and to justify program funding. For each ITS technology, performance measures that will provide sufficient information to evaluate the effectiveness of the system are shown in the exhibits below.

Exhibit 3-5: Performance Measures for On-Board Equipment

ON-BOARD EQUIPMENT						
CAD/AVL (including MDT)	**APC**	**AVA**	**TSP**	**AFC**	**On-Board Camera**	**Vehicle Diagnostics**
Schedule adherence Incident response times	Number of passengers	Customer feedback Increased ridership	Schedule adherence Traffic controller logs	Number of passengers Cash reconciliation	Number of security incidents	Reduced breakdowns

Exhibit 3-6: Performance Measures for Central System Equipment

CENTRAL SYSTEM EQUIPMENT			
Interactive Voice Response	**Real-Time Info on Web**	**Real-Time Info on Mobile Device**	**Scheduling and Run Cutting Software**
Number of calls Reduced number of complaints User satisfaction Customer feedback Average call length	Number of subscribers Number of hits or page views Reduced number of complaints Customer feedback	Number of hits or page views Reduced number of complaints Customer feedback	Schedule adherence Staff feedback Historical data and reporting

Exhibit 3-7: Performance Measures for Wayside Equipment

WAYSIDE EQUIPMENT	
Terminal Display	**Terminal Security Cameras**
Customer feedback Increased ridership	Number of security incidents

3.8 Project Development and Resources

Successful ITS applications follow a user needs driven development cycle, with structured processes employed to demonstrate accountability to the user needs. The US DOT advocates for the application of the 'V-model' systems engineering process, as depicted in Exhibit 3-8.

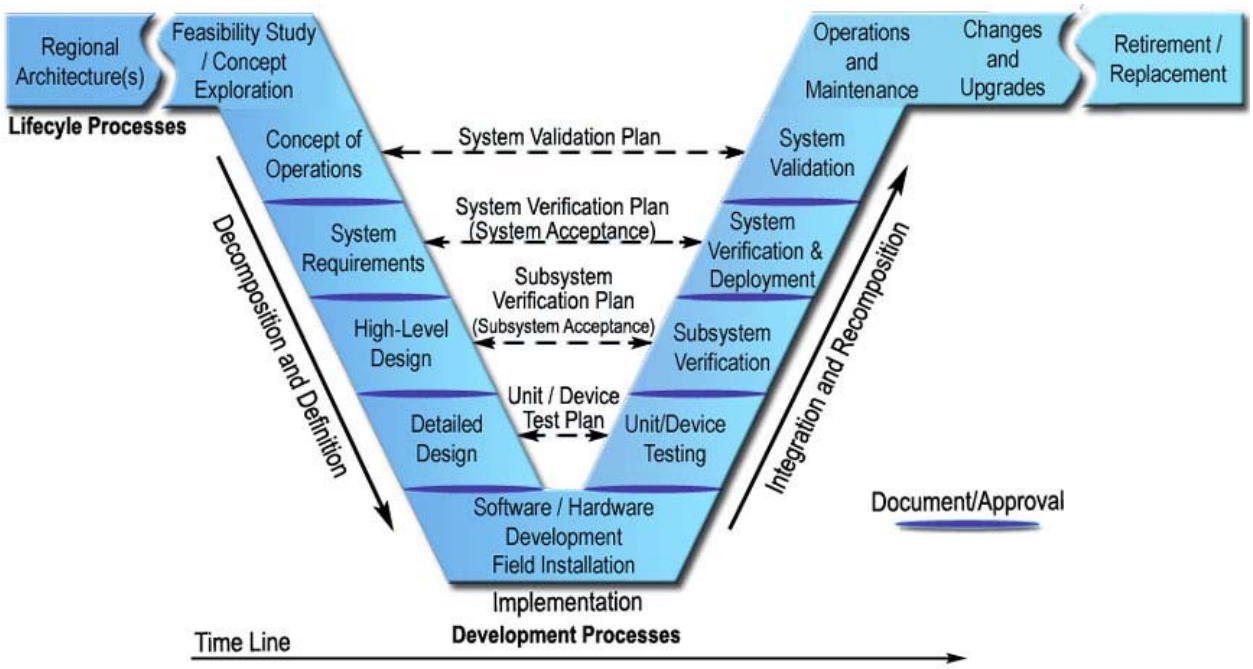


Exhibit 3-8: Systems Engineering Process

Transit ITS applications should not be considered as commercial-off-the-shelf deployments. Rather, there is a range of vendors and system solutions available in the marketplace, all requiring a degree of customization, integration and configuration to meet the needs of a given transit operator. The 'V-model' outlines the process to document user needs in the form of system specifications, and perform testing to verify subsystem performance and validate overall system operational objectives. This proven and federally supported approach to technology projects can provide many benefits over an ad-hoc approach to procuring or deploying ITS technology.

The first step once an agency has identified a potential need for a specific technology is to develop a concept of operations. This is a user-oriented document that describes the characteristics for a proposed system from the viewpoint of any individual or organization who will use the proposed system in their daily work activities or who will operate or interact directly with the system. This includes employees, contractors, external entities and customers. The concept of operations describes how the technology will be used, the changes to existing operations and systems and interaction with other systems and stakeholders. This crucial early step in the process, especially the identification and interaction with external stakeholders, will help to ensure that the maximum benefits are realized from the final procured system which is targeted at the true needs of the operator. This process helps to identify the functions that are really needed by the operator, optional features that would be nice to have and prevent mistakes or costly rework later in the design or deployment phase. The concept of operations also allows a transit operator to determine their long-term vision for their ITS deployments and helps to ensure a phased approach can be adopted, starting with core components and adding capabilities over time.

A key aspect of the systems engineering process is traceability from the concept of operations through requirements, design, testing and validation. This ensures that the final deployment provides the user functionality documented in the concept of operations or that considered trade-offs are made throughout the process to modify the initial concept. The first step in this traceability is to develop system requirements that reflect the functionality and interfaces laid out in the concept of operations. The requirements should be functionally oriented and not pre-suppose a particular system design. Depending on the specific technologies being sought, these requirements may be shared between different operators to ensure compatibility and potentially reduce the cost and complexity of the procurements. The system requirements are also used as the basis of the system verification testing, ensuring complete and structured verification of the functionality of the delivered system and ensuring that promise of a phased deployment can be realized.

This systems engineering process can be undertaken by transit operator staff or outside resources. Training in the process is available for operators through USDOT. Several such sessions have already been supported by DRPT for Virginia transit operators. Anecdotal feedback on these sessions has indicated a high level of utility to the operators and has resulted in review of ongoing procurement activities to follow this more structured approach. Alternatively, the transit operator can hire expert consultant resources to assist in the process and take advantage of peer review opportunities. Depending on the technology being considered, it may be more efficient and beneficial for several operators to get together to pursue the initial concept of operations and requirements development to allow identification of common needs and the potential for joint procurements or shared procurement documentation. While these external resources can provide significant support to operators deploying ITS, they do not remove the need for an internal champion within the operator's organization. This champion needs to take ownership of the entire process and truly understand the problem, process and product from the operator perspective.

3.9 Typical ITS Deployments

Depending on transit service type and fleet size, typical ITS deployments are identified and shown in Exhibit 3-9 below.

These technology deployments are typical in terms of what is seen across the industry at large and should not be taken as the recommended solution for each individual transit operator that fits in that category without doing a needs assessment specific to that transit operator.

Exhibit 3-9: Typical ITS Deployments

		On-Board Equipment						Central System Equipment								Wayside Equipment		
		CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Fixed-Route	300+ Vehicles	●	●	●	●	●	●	●	●	●	●	●	●	●	◐	●	●	◐
	100-300 Vehicles	●	●	●	◐	●	●	◐	◐	◐	◐	●	●	●	◐	●	●	◐
	<100 Vehicles	●	◐	●	○	◐	◐	◐	◐	◐	○	●	◐	◐	◐	◐	○	○
Demand-Response	Large (50+ Vehicles)	●	-	-	-	◐	●	◐	◐	-	◐	●	●	○	○	-	-	-
	Small (<50 Vehicles)	●	-	-	-	◐	◐	○	○	-	○	●	●	○	○	-	-	-
	Commuter Bus	●	○	◐	◐	●	●	●	●	◐	●	◐	◐	◐	○	●	●	○
	Passenger Rail	●	◐	●	○	◐	●	●	●	●	◐	●	◐	◐	○	●	●	◐

● Widespread ◐ Less Common ○ Optional - Not Applicable

Note: The Passenger Rail category includes commuter rail, heavy rail, and light rail.

4 Survey Results Summary

A web-based survey was circulated to all transit operators state-wide. This survey provided the bulk of the information for this plan, but there were a number of other transit operators that provided information in the later stages of the project. In order to ensure the accuracy of the survey results and to capture additional transit operators that did not respond to the initial survey, an outreach initiative was conducted. Each transit operator was contacted directly via email and sent their transit operator's program form. Those transit operators who responded to the survey validated the information presented on the form. Those transit operators that did not respond to the survey provided new information by filling out the form. This interaction occurred via email and telephone.

A breakdown of the transit operators by service type and fleet size is shown in Exhibit 4-1 as follows. This chart also shows if the transit operator responded through the survey and/or through the outreach initiative after the survey. There are a total of 37 transit operators state-wide. Of this total, 28 operators identified transit ITS needs.

From the survey results, a picture of the current state of ITS deployment has emerged. Each transit operator's existing ITS deployments were mapped to the typical deployments for that transit operator's corresponding service type and fleet size category. The results can be seen in Exhibit 4-2 for Fixed-Route services (including Commuter Bus and Rail) and in Exhibit 4-3 for Demand-Response services. These diagrams illustrate how far along each transit operator is in deploying ITS technologies as compared to the typical deployments.

Exhibit 4-4, Exhibit 4-5 and Exhibit 4-6 provide other key findings from the survey including deployment priorities, ITS preparedness, and technology deployment details. For the complete package of survey responses, refer to Appendix A of this plan.

Exhibit 4-1: Transit Operator Survey Respondents

	SERVICE TYPE							TRANSIT OPERATOR RESPONSE	
	Fixed-Route			Demand-Response		Commuter Bus	Rail	Survey	Validated Form
TRANSIT OPERATOR	Large (300+)	Medium (100-300)	Small (<100)	Large (50+)	Small (<50)				
Alexandria Transit Company			x					x	x
Arlington Transit			x	x				x	
Bay Transit					x				x
Blacksburg Transit			x		x			x	x
Blackstone Area Bus			x						x
Charlottesville Transit Service			x		x			x	
District Three Public Transit			x						x
Fairfax County DOT (Fairfax Connector)		x						x	
Fairfax CUE			x						x
Farmville Area Bus			x						x
Four County Transit			x		x			x	x
Greater Lynchburg Transit Company			x		x				x

	SERVICE TYPE							TRANSIT OPERATOR RESPONSE	
	Fixed-Route			Demand-Response		Commuter Bus	Rail	Survey	Validated Form
TRANSIT OPERATOR	Large (300+)	Medium (100-300)	Small (<100)	Large (50+)	Small (<50)				
Greater Richmond Transit Company		x		x				x	x
Greater Roanoke Transit Company			x		x			x	
Greene County Transit, Inc.					x			x	x
Hampton Roads Transit	x			x				x	x
Harrisonburg Department of Public Transportation			x		x			x	
JAUNT Inc.				x				x	x
King Street Trolley			x					x	
Lake County Area Transit					x			x	
Loudoun County Office of Transportation Services						x		x	x
Potomac & Rappahannock Transportation Commission			x		x	x		x	x
RADAR			x		x			x	
Virginia Railway Express							x	x	x

	SERVICE TYPE							TRANSIT OPERATOR RESPONSE	
	Fixed-Route			Demand-Response		Commuter Bus	Rail	Survey	Validated Form
TRANSIT OPERATOR	Large (300+)	Medium (100-300)	Small (<100)	Large (50+)	Small (<50)				
Virginia Regional Transit			x		x			x	
Williamsburg Area Transport			x		x			x	
Winchester Transit			x						x
WMATA	x			x			x	x	x

Exhibit 4-2: Fixed-Route ITS Deployment Snapshot

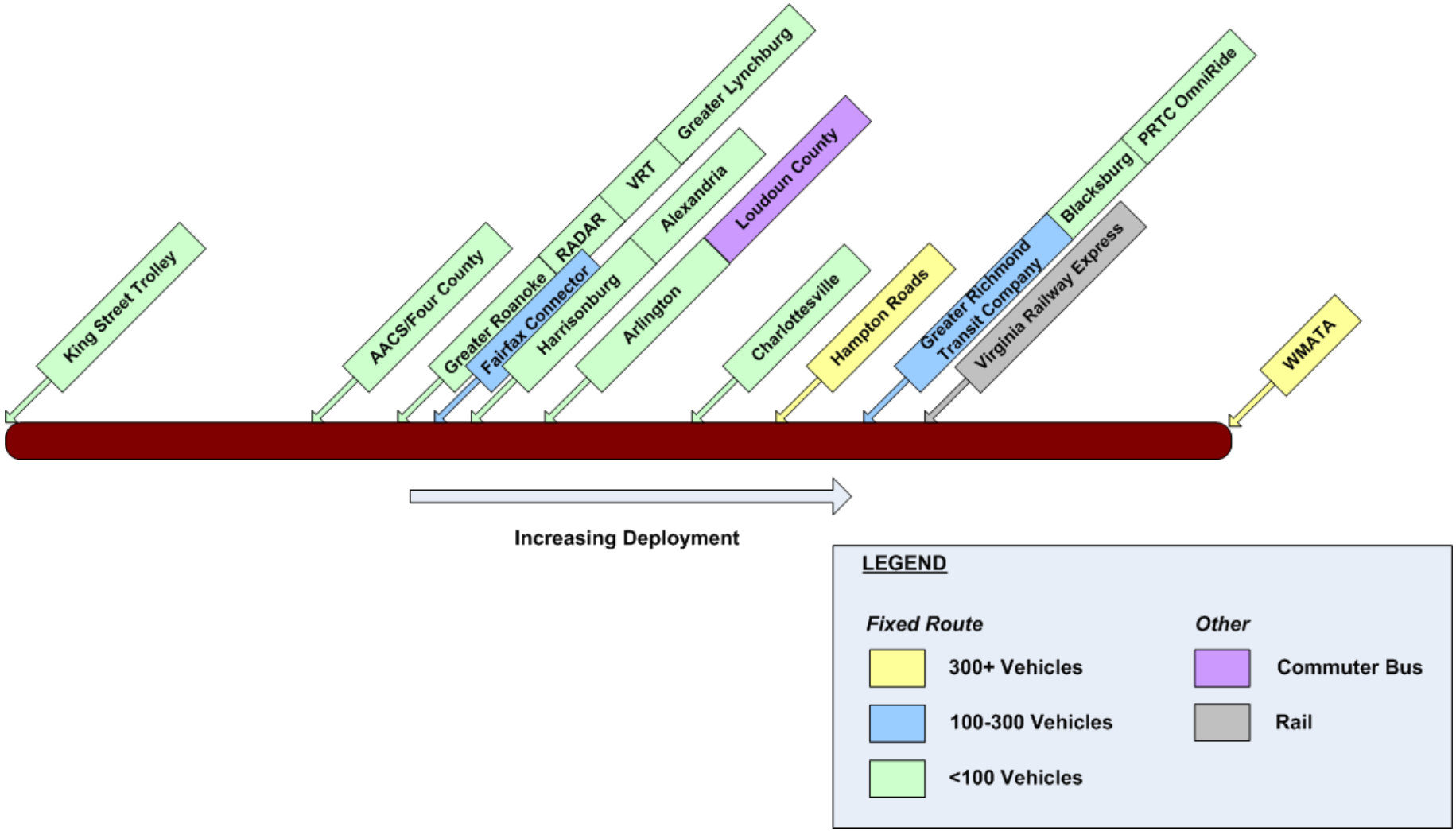
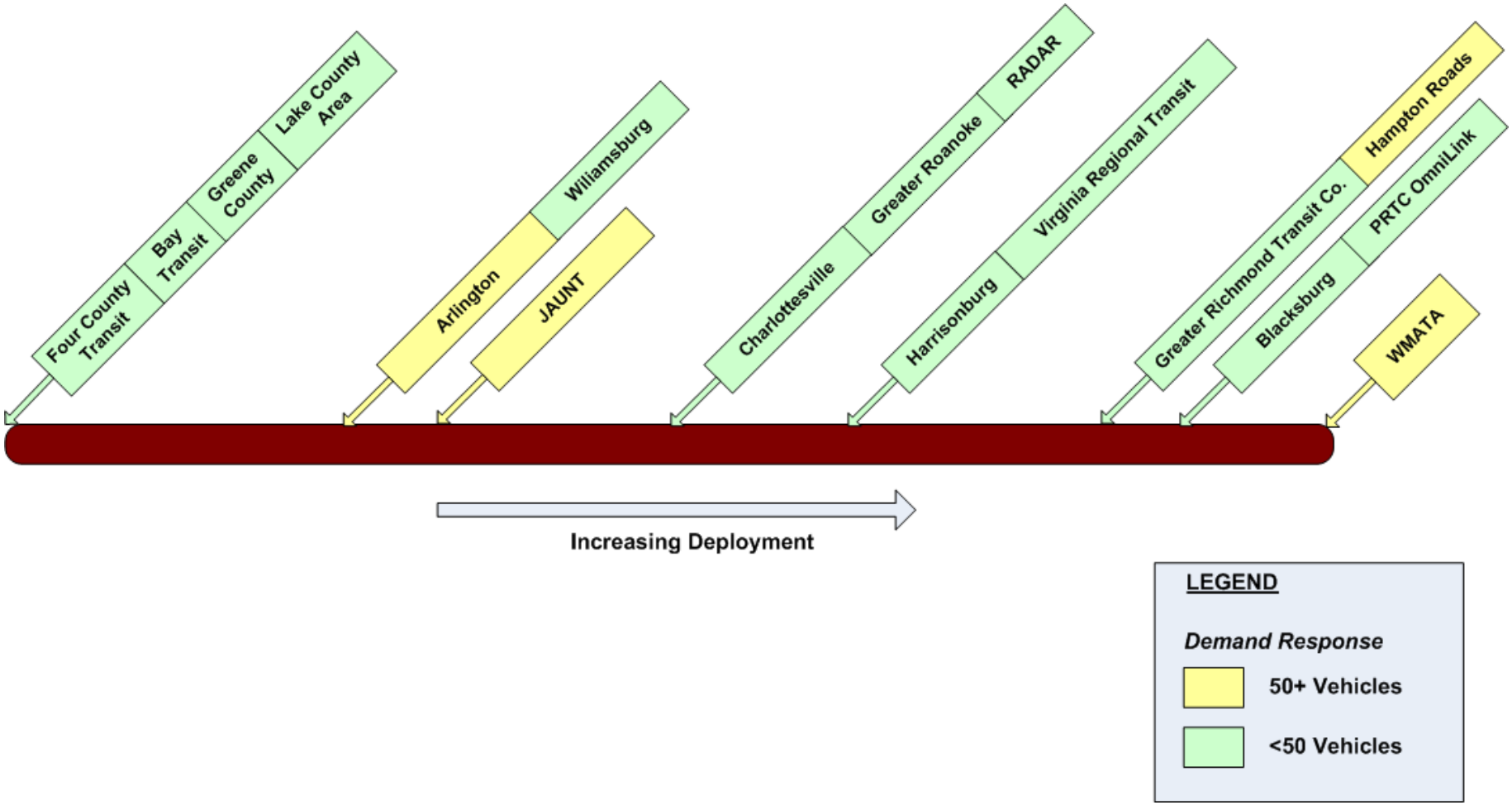


Exhibit 4-3: Demand-Response ITS Deployment Snapshot



In the survey, transit operators were asked to prioritize future ITS deployments. The top deployment priorities as identified in the survey are shown in Exhibit 4-4.

Exhibit 4-4: ITS Deployment Priorities

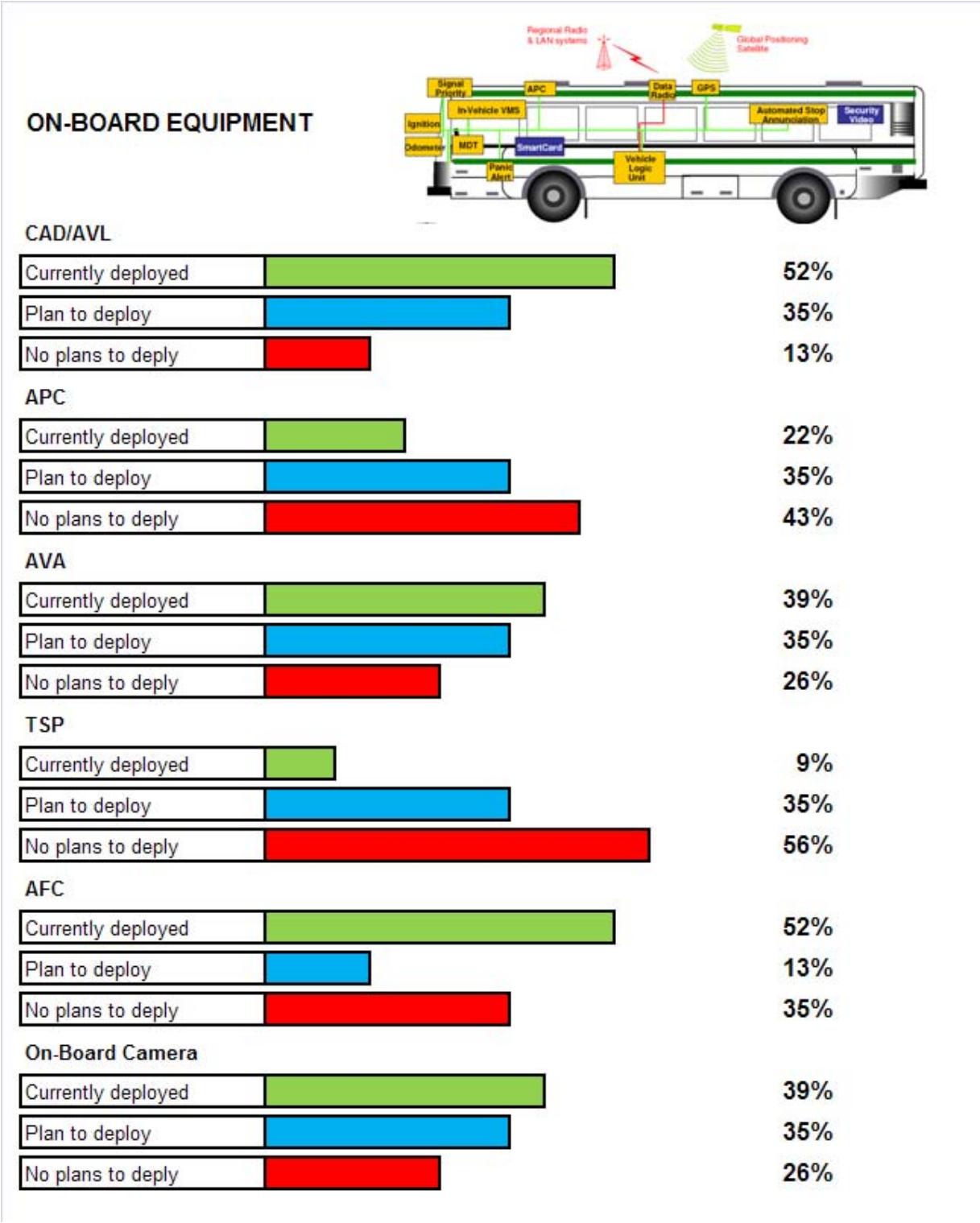
Automatic Vehicle Location and/or Computer Aided Dispatch Capabilities
Scheduling and Run Cutting Software
Radio Voice Transmissions
Maintenance Management Systems
Smart Card Fare Payment
Radio Data Transmissions
Automatic Passenger Counters
Driver Assignment and Workforce Management Systems
Real Time Information Available On-Line
Registering Farebox

Transit operators were also asked to rate how prepared they were to support the procurement and deployment of ITS technologies. The response of transit operators regarding ITS preparedness is shown in Exhibit 4-5.

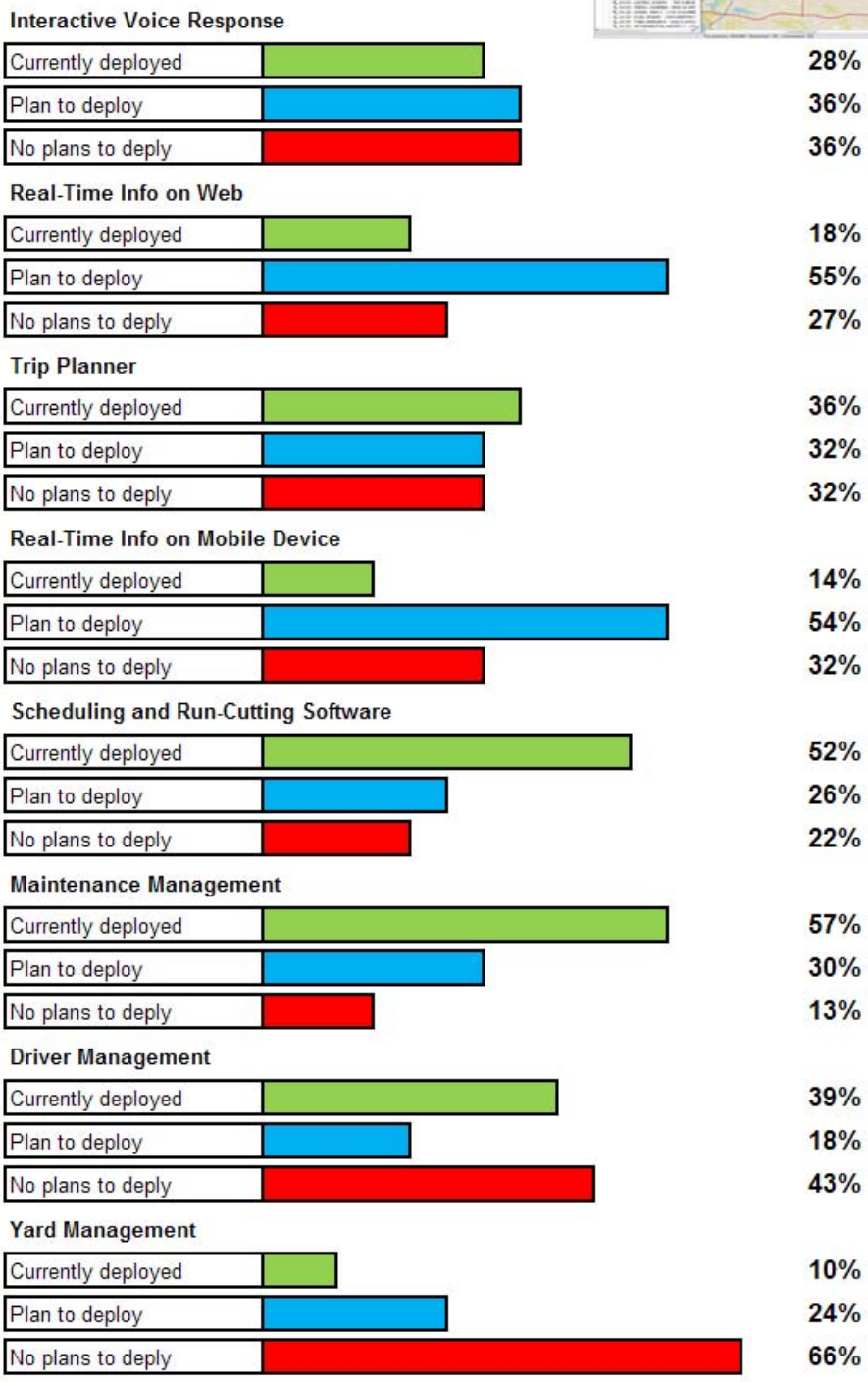
Exhibit 4-5: ITS Preparedness

Transit operators were surveyed about specific technology deployments. For each ITS technology, transit operators were asked to identify if this technology is already deployed as part of daily operations or is a consideration for future deployment. The responses are summarized in Exhibit 4-6 and are categorized by the technology groupings of On-Board Equipment, Central System Equipment, and Wayside Equipment.

Exhibit 4-6: Technology Deployment Survey Results



CENTRAL SYSTEMS EQUIPMENT



WAYSIDE EQUIPMENT

Information Display

Currently deployed	18%
Plan to deploy	55%
No plans to deply	27%

Security Camera

Currently deployed	20%
Plan to deploy	34%
No plans to deply	46%

Security Alarm Button

Currently deployed	15%
Plan to deploy	19%
No plans to deply	66%

5 Implementation Challenges

Deployment of ITS is a significant departure from "business as usual" for many transit operators. Projects can cut across all types of transportation facilities and raise a whole host of new implementation questions. Balancing ITS and "traditional" transportation investments becomes a challenge, as does finding the right personnel for the job. In fact, the multitude of "institutional issues" related to ITS planning and deployment are so significant that they often overshadow the technological challenges of a given project.

There are five groups of challenges that are anticipated to have a bearing on the success of implementing the ITS Plan. The groups are:

- Organizational Issues;
- Project Finance;
- Legal;
- User Acceptance; and
- Technical.

Each of these groups of barriers is described in the subsections below.

5.1 Organizational Issues

Coordination

One of the most widely documented institutional issues in the Transit ITS industry is operator coordination and communication. For maximum benefits, projects can be designed with the needs of a wide array of users (travelers) and transit operators in mind. Currently, transit operators across the State have deployed a variety of ITS technologies for improving their local operations. As well, several transit operators have developed their own ITS plans. These ITS deployment and planning activities have been driven primarily by local need, rather than a coordinated planned deployment that focuses on the comparative needs between transit operators across the State. A program of ad-hoc deployment can lead to stovepipe systems, less competitive procurements, varying technology standards and difficulties in data sharing between transit operators or even within the same transit operator.

WMATA identified "leadership gaps both internally and region-wide" as a general operator coordination barrier to ITS deployments. A more specific operator coordination barrier for Fairfax CUE is the "technological challenge in integrating the AVL system with surrounding transit operator's AVL deployments".

There is willingness for transit operators to participate in a coordinated approach, as shown through responses to the survey and outreach initiative conducted for this project. One of the key objectives is to develop a coordinated approach for ITS deployment across the Commonwealth of Virginia. Section 8.1 identifies coordinated procurement opportunities based on transit operator-specific plans for deployment, size and service type, and regional considerations.

There are a variety of options available to bring people and agencies together. Typically agencies that are at a similar level of technology deployment or about to embark on deployment of an ITS component can collaborate to some extent to achieve mutual benefit. This may start with mutual investigation of the technologies available in the marketplace and the agencies' unique requirements; perhaps sharing a third party resource. Where the agencies have sufficient requirements in common, joint specifications or even joint procurements can be considered. Ongoing updates to this plan and regular outreach efforts such as an annual state-wide transit ITS workshop should be used to help identify ongoing opportunities for such inter-operator collaboration.

It is also important to note that coordination within a transit operator can also be an issue, especially for larger transit operators. Sometimes it is not clear as to who would take responsibility for new and emerging ITS technologies, for example, by operations, maintenance, or IT. The success and level of ITS deployment is clearly strengthened by an ITS champion within an organization to lead the charge in illustrating the potential benefits and following through with a structured approach to delivery to ensure these benefits are realized. The systems engineering process described in Section 3.8 will help to ensure all stakeholders, both internal and external, have appropriate involvement in the ITS development process to ensure that the ITS benefits are realized across the organization. External stakeholders in such efforts could include other regional service providers, other, non transit departments with the city, town or county, VDOT, and the Virginia Department of Emergency Management (VDEM.)

Technical Skill Sets

Most transit operators have hired technical expertise to deal with traditional transportation tasks like maintenance, transit operations, etc. Few transit operators, however, have ITS-specific expertise. ITS deployment necessitates that transit operators quickly acquire a broad set of high-technology skills.

Through the survey and outreach initiative, several transit operators have specifically identified this as a barrier to deploying ITS technologies. Hampton Roads, a large fixed-route transit operator stated

"depth of technical support staff" as a barrier. A large demand-response transit operator, JAUNT similarly identified similar concerns regarding ITS deployments. Both small fixed-route services, Greater Lynchburg Transit Company and Blackstone Area Bus stated "engineering / planning / project management (understaffed)" and "lack of staff" respectively.

The challenge of having in-house ITS expertise is an issue that affects transit operators regardless of size and service type. Transit operators are likely to be utilizing staff at capacity and may not be able to dedicate staff to manage ITS projects.

Examples of potential actions to mitigate these challenges include:

- Working with universities and colleges to promote programs that emphasize skills appropriate for ITS. Systems engineering is often a key need;
- Promoting professional capacity building programs to introduce existing staff to skills necessary to support ITS;
- Implementing project teams made up of individuals with diverse skill sets. Facilitating exchanges of staff between different offices and/or transit operators;
- Promoting participation and representation in organizations such as ITS America, ITS Virginia, and American Public Transportation Association (APTA) that provide access to industry leaders, access to international standard-setting activities and a host of other benefits;
- Establishing a peer review process to allow an operator to benefit from lessons learned by others who have already deployed a particular technology; and
- Establishing statewide transit ITS information sharing forums, perhaps including an annual workshop and Internet resources such as a listserv where DRPT can provide access to common technical resources through its various contract arrangements.

Customer Focus

Transit operators are under increasing pressure to accommodate the transportation needs of their communities with a new customer focus. In recent years, transit riders, as with all transportation customers, have become significantly more technology aware and demand improved operations and information about those operations. Virginia transit operators have already demonstrated significant progress toward meeting this challenge, having deployed a variety of traveler information systems including advanced activities in the area of open source systems and broad participation in Google Transit. Through further coordination of project activity, there is an expectation of increasing the availability of real-time information and moving toward corridor based information that can cross multiple operators and potentially modes.

5.2 Project Finance

All government agencies are facing constrained budgets, and each year the challenge of providing the same level of service becomes more and more difficult. In the conventional transportation funding model ITS could represent an additional burden for government agencies. The very nature of ITS makes it necessary for transit operators to change the way they see their customers.

Of the transit operators that identified barriers to their ITS program plan, most identified lack of funding as a barrier. Some transit operators stated a general lack of funds as a barrier. These transit operators include Blackstone Area Bus, District Three Public Transit, and Four County Transit. Transit operators that identified operational funding, such as maintenance and system fees, as a barrier include

Hampton Roads and Greater Lynchburg Transit Company. Loudoun County Office of Transportation Services stated that financial resources for transit are currently being used to develop infrastructure (i.e. park and ride lots and maintenance facilities) rather than ITS projects.

Section 9 details specific funding resources for transit operators in Virginia. Such funding sources normally cover capital costs and perhaps initial operation. Agencies must incorporate additional ongoing operations and maintenance costs into their future operations budgets.

5.3 Legal

Liability and Privacy

A significant risk to both government agencies and commercial vendors is legal liability. Any new technology or process raises questions pertaining to how the user can expect to be protected and who is at fault if the system does not perform as expected.

Another barrier to widespread adoption of certain technologies is privacy. For example, travelers may be concerned that Smart Card technology may eventually lead to "Big Brother" tracking an individual's daily movements.

Examples of potential actions to mitigate the challenge of privacy issues include:

- Undertaking outreach efforts to identify privacy concerns among the traveling public; and
- Undertaking public relations campaign to relay concerns regarding privacy and information use.

The "Big Brother" perception among transit vehicle operators in the earlier days of ITS quickly dissipated as drivers understood how CAD/AVL was being used, and the benefits to them in terms of personal security, etc.

Intellectual Property

Many ITS projects involve a commercial vendor developing a customized computer and/or telecommunications package for a government transit operator. In some cases this project may be a public-private partnership, while in others it may be a conventional customer-vendor arrangement. The development of technologies and processes under these arrangements raises intellectual property issues. Typically the transit industry has invested in proprietary products. Most attempts at standardization have been too complicated to be made use of by transit operators and have not been fully embraced by vendors. This leads to operators being locked into proprietary systems that can only be expanded by their existing vendor. This has also made it difficult for the industry to find low cost technology solutions. The broad adoption of Google Transit Feed specifications is helping to provide a beginning level of central system interoperability, allowing the exchange of detailed schedule data without development of proprietary interfaces.

In order to address this issue, there are several avenues that can be explored as part of a state-wide program such as:

- Develop standards based language that can be used to procure equipment with truly open and testable interfaces and provide support to ensure these standard interfaces are provided in the deployed system; and
- Support and encourage open source software development to allow operators to more directly benefit from efforts made by other agencies and to promote use of low cost and technically

capable resources (such as Universities) for enhancing the systems. This activity should be undertaken under the new Virginia law that came into effect on July 1, 2009 which will result in the development of statewide policies for the development and distribution of open source and creative commons software by state agencies.

Procurement Practices

Public sector departments active in the ITS arena are typically limited in their flexibility with respect to procurement policies and mechanisms. In the interest of equitability, government agencies are typically restricted to public tender and RFQ/RFP processes for procurement. For transit operators, these processes are typically oriented towards procurement of vehicles or infrastructure development and may not provide the flexibility for innovative multi-transit operator ITS applications.

Section 8.1 outlines approaches for a coordinated procurement between multiple transit operators to capitalize on the benefits of cost savings and interoperability of systems.

Policy and Legislation

Current government policy at all levels is unlikely to be broad enough to accommodate the intents and methods that ITS will require as it becomes sought for wider application. In addition, aspects that include public-private partnerships, guidelines and best practices to encourage use of ITS, intellectual property, and privacy must be addressed in order that the application of new technologies can be implemented and within acceptable boundaries of use.

Examples of potential actions to mitigate these challenges include:

- Examining legislative requirements to facilitate public-private partnerships;
- Providing policy framework and department autonomy to facilitate rapid response to public-private partnership opportunities;
- Establishing a task force to identify/prioritize legal issues that require attention to facilitate ITS. Where necessary, recommend changes to legislation to support use and implementation;
- Establishing guidelines and best practices to encourage responsible activity by government agencies and/or private vendors (such documentation reduces the liability risk to both agencies and vendors);
- Establishing guidelines for dealing with intellectual property concerns in agreements with the private sector; and
- Providing the flexibility and autonomy to pursue innovative initiatives while maintaining principals of equity and open procurement.

5.4 User Acceptance

The ability of the public to accept new technology applications and integrate these applications into their daily routines is a critical consideration for ITS deployment. The public's perception of how a technology is being applied will influence the rate of acceptance. Accuracy of transit information provided is key to maintaining credibility and public acceptance. As information flows within the transportation sector become more automated, there is increasing public concern over the transfer of information.

A study was conducted by DRPT to identify transit and transportation demand management enhancements to increase mobility in the I-66 Corridor. One of the findings of the study showed that the advanced technologies of BRT increased its appeal to the travelling public. Roughly 60% of people polled said they are "very likely" to use BRT if it was available in their area. The availability of real-time information was found to be most useful to transit users. Results like this show that the public is generally willing to accept new technologies, as long as performance is reliable.

5.5 Technical

ITS architecture and standards are crucial to ensuring that whatever technologies are deployed deliver the maximum benefits to the traveling public and government agencies. Many jurisdictions may already have components of incompatible systems in place and will be reluctant to agree to a standard that requires them to replace their existing equipment. Similarly, private sector vendors will lobby aggressively for those specifications that are closest to their existing products and capabilities.

VDOT has led efforts in Virginia to develop regional and state-wide ITS architectures. This has included outreach to DRPT and transit operators to ensure that the architectures reflect the ITS activities being undertaken by the transit operators and the linkage between the highway based ITS and transit ITS. Through this participation and consultation, DRPT and the participating transit operators have ensured that transit is adequately represented. Due to the regional nature of transit operators, the state-wide architecture includes only a few interactions with transit operators; namely delivery of data to Private Sector Information Service Providers (ISPs) for dissemination to the public and private planning tools (e.g. Google), a Transit Equipment Database to support maintenance of an inventory of transit vehicles that could be accessed for emergency situations and a Virginia Transit Data Archive for maintaining historical data. The latter two data systems are potential future activities that have been accounted for in the architecture to ensure future needs are assessed as part of the deployment of other ITS technologies. The need for these systems will be assessed as part of the data sharing activities defined later in this report.

At the regional level, the interaction between vehicles, transit operator centers and other regional systems has been defined for regional transit operators.

A continuing program of awareness should be employed to endure that these architectures are used as part of the systems engineering process as transit operators embark on deployment of their ITS systems. This will help to ensure that systems are developed within the broader regional context maximizing benefits and expandability.

6 Strategic Initiatives

6.1 Resource Sharing

The idea of resource sharing is to identify technologies that present opportunities for coordination between transit operators to gain benefits (mainly cost reduction). Several factors must be taken into consideration when identifying these opportunities, including characteristics of the technology project, transit operator size, type, and location.

Examples of resource sharing include:

- **Shared communications network** – This is the backbone technology to enable communications between vehicles and a central operations center. Obtaining licenses and setting up a network can be expensive. Multiple nearby transit operators sharing the spectrum will reduce costs and make more efficient use of the resource. This has to be determined on a per-transit operator basis. Two nearby transit operators that both require significant bandwidth will not be able to share the limited bandwidth provided by the license.

- **Open data access** – This approach provides transit operators the means to share multi-service, multi-operator information to travelers. As a resource sharing project, the cost of maintaining servers, networks and updating software will be shared among multiple transit operators. This form of resource sharing offers a degree of scalability if greater demand arises as additional servers and staff can be easily added.

- **Spare parts** – Transit operators may share or form a centralized spare parts repository. In cases where transit operators have the same product installed, this creates the opportunity to reduce the cost to purchase and store spare parts. Transit operators would each have a smaller number of spare parts locally for immediate use, and would have a mechanism in place to quickly request and access additional spare parts to replenish the local supply. In addition to the parts themselves, operators can also share maintenance and technical support resources and asset management tools. This could especially benefit smaller agencies providing them with more ready access to technical resources, access to a more capable asset management system and greater negotiating power with vendors. The current asset management capabilities would need to be enhanced to support these activities.

- **Standards** – In order to maximize interoperability between ITS system components and between transit operators, standards should put in place and adopted where possible. This may include a centralized identification of appropriate standards, documentation of recommended approaches and integrated technical support to help maximize the compliance achieved by purchased systems. Most ITS projects can benefit from this activity. Such standard support activities such as the Google Trip Planner and ensuring vehicle specifications include ITS wiring provisions.

It is important to note that it may not be feasible to take advantage of every resource sharing opportunity due to the local needs of the individual transit operators and DRPT. Section 8.2 Cross-Cutting and Research Efforts presents several regional projects recommended for Virginia transit operators.

6.2 Procurement Strategies

There are various procurement strategies that can be employed by transit operators looking to achieve certain objectives, including:

- Lower cost to deployment;

- Expedited procurement/implementation period;

- Improved integration to other systems and/or transit operators;

- Enhanced technical knowledge/expertise; etc.

The following table provides a summary of these strategies, along with the benefits and disadvantages that they bring. It should be noted that these strategies are not necessarily independent, and may be combined as appropriate to benefit the transit operator (or transit operators) involved. Also, these procurement strategies should not be limited to partnerships within the public domain as some projects may be well-suited to public-private partnerships (e.g. Google Transit).

Exhibit 6-1: Assessment of Procurement Strategies

Procurement Strategy	Benefits	Disadvantages
Joint Procurement A joint procurement typically involves two or more transit operators preparing a single bid solicitation instrument that encompasses multiple, highly similar deployments. This may be driven by location of transit operators (i.e. nearby transit operators), or by a specific technology where standardization is preferable (i.e. fare collection for interconnecting transit operators).	• Enhanced technical knowledge (i.e. shared technical resources) • Potentially reduced costs to prepare and administer the contract • Increased negotiating power with contractor and associated lower unit costs (economies of scale) • Improved technical interoperability and corresponding regional integration	• Difficulty in customization of system to transit operator-specific needs • Additional costs associated with multi-transit operator coordination • Committing to a shared schedule
Open-Ended Procurements An open-ended procurement provisions and allows for straight-forward expansion of scope – one such example is for a transit operator to have a vendor of record, or in some cases, retainer agreements. Often this can also be used to allow other transit operators to piggyback onto existing contracts. In some cases, this may just require an additional contract clause that allows others to buy-in (e.g. INIX I-95 contract, North Carolina statewide paratransit software contract).	• Increased negotiating power with contractor and potentially lower unit costs (economies of scale) • Improved technical interoperability and corresponding regional integration • Time savings in procurement, for transit operators that are piggybacking on to existing contracts • Reduced cost to develop procurement documents for piggybacking transit operators	• Little immediate benefit to initial contracting transit operator • Additional complexities in developing contract • Piggybacking transit operators may have to settle with regards to technical differences
Common Procurement Sections DRPT or statewide transit operators may consider developing common language for procurement documents. This may include: • General contract terms and conditions;	• Time savings in procurement for transit operators that are using existing contract materials • Reduced transit operator cost to develop procurement documents • Enhanced technical	• Complexities in developing materials that meet all the transit operators' internal requirements • Transit operators using materials may have to settle with regards to

• Technical content for parts or all of specifications for certain technologies; • Interface specification. In some cases, there may be existing documentation base to work from.	knowledge (i.e. shared technical resources) • Improved technical interoperability and corresponding regional integration	technical differences
Stakeholder Involvement and Peer Review Stakeholders and peer transit operators can be included in developing and reviewing procurement materials, as well as assisting in the procurement and evaluation process. This can include: • Reviewing and providing feedback/input to the procurement documents, including specifications; • Reviewing and evaluating proponent submittals • Providing reference/external feedback with relation to vendor experience.	• Enhanced technical knowledge (i.e. shared technical resources) • Improved technical interoperability and corresponding regional integration	• Dealing with contradictory feedback and competing priorities • Challenges related to managing size and scale of project

7 Transit Operator Deployment Plans

Individual transit operator deployment plans were developed and presented in a standard form.

A sample of the form is shown in Exhibit 7-1 as follows.

Exhibit 7-1: Transit Operator Program Form Template

Transit Operator:

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Projected Deployment (next 6 years)																
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Typical Industry Deployment Path																
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs

Participants / Resource Sharing

Barriers

VIRGINIA DEPARTMENT OF RAIL AND PUBLIC TRANSPORTATION
INTELLIGENT TRANSPORTATION SYSTEMS PLAN

Sections of the form are described as follows:

- The first box entitled “Program Description” shows a table with a series of circles. The first row indicates the transit operator’s existing technology deployment. The second row provides a snapshot of the transit operator’s technology deployments at the end of the next 6 years. And the third row called “Typical Industry Deployment Path” shows technologies deployed for transit operators of similar service type and fleet size. One thing to note is that some transit operators provide multiple types of services. For the purpose of these individual transit operator forms, the “Typical Industry Deployment Path” is determined by the primary service type provided.

- The second box entitled “Action Plan” shows the technology projects the transit operator is planning to undertake with details on budget and estimated timeline.

- The box entitled “Participants / Resource Sharing” is meant to show a list of stakeholders that will need to be engaged to undertake the Action Plan defined above. This list could include connecting transit operators, internal transit operator departments, etc.

- The box titled “Barriers” is meant to show potential issues and challenges for the transit operator in deploying the Action Plan. Examples include lack of operational funding, lack of technology staff, etc.

The completed forms for all 37 transit operators state-wide can be found in Appendix B.

8 Coordinated Program

This section describes a coordinated ITS program for all transit operators in the state. First, coordinated approaches to procurement for near-term deployments are described in Section 8.1. Then, Section 8.2 presents a number of cross-cutting and regional projects that provide benefit to multiple transit operators or entire regions.

Exhibit 8-1 provides a summary of each transit operator’s ITS deployment plans for the near-term (1-2 years), mid-term (2-6 years), and long-term (6+ years) as identified by the survey and outreach initiative. For near-term deployments, a capital cost estimate is also provided, either by the transit operator or as formulated by the project team (highlighted in grey). For those transit operators that did not respond to the survey or outreach initiative, it is assumed future ITS may be anticipated in the long-term.

Exhibit 8-1: ITS Deployment Plan Summary

	ITS DEPLOYMENT PLANS		
TRANSIT OPERATOR	**1 - 2 Years**	**2 - 6 Years**	**6+ Years**
Alexandria Transit Company	CAD/AVL Onboard cameras (full fleet) APC (9 vehicles) Next Bus Arrival Display (pilot) *Estimated Cost: $700,000*	Next Bus Arrival Display (roll-out)	
Arlington Transit	Real-Time Information on Web Real-Time Information on Mobile Device *Estimated Cost: $100,000*	IVR Phone System On-Board Cameras Transit Trip Planner Scheduling and Run Cutting Software	
Bay Transit	CAD/AVL Scheduling and Run Cutting Software Maintenance Management Software Driver Assignment and Workforce Management System Yard Management System Automatic Passenger Counters Transit Trip Planner *Estimated Cost: $1,650,000*	Automated Stop Announcement / Message Signs On-board Cameras	

	ITS DEPLOYMENT PLANS		
TRANSIT OPERATOR	**1 - 2 Years**	**2 - 6 Years**	**6+ Years**
Blacksburg Transit	Next Bus Arrival Display Real-Time Information on Web (www.bt-tracker.com) Real-Time Information on Mobile Device IVR Phone System *Estimated Cost: $50,000* *(for Next Bus Arrival Display and IVR only)*	In-Station / Stop Security Camera In-Station / Stop Emergency Alarm (at new transfer facilities)	
Blackstone Area Bus	Security System for Bus Office *Estimated Cost: $35,000*		
Bristol Transit			Future ITS may be anticipated
Charlottesville Transit Service	Transit Trip Planner *Estimated Cost $50,000*	Maintenance Management Software Yard Management System	
Danville Transit			Future ITS may be anticipated
District Three Public Transit	CAD/AVL Scheduling and Run Cutting Software *Estimated Cost: $230,000*		

	ITS DEPLOYMENT PLANS		
TRANSIT OPERATOR	**1 - 2 Years**	**2 - 6 Years**	**6+ Years**
Fairfax County DOT (Fairfax Connector)	Maintenance Management Software *Estimated Cost: $200,000*	Yard Management System Automated Stop Announcement / Message Signs Automatic Passenger Counters On-Board Cameras In-Station / Stop Security Camera & Emergency Alarm Next Bus Arrival Display Real-Time Information on Web & Mobile Device CAD/AVL	
Fairfax CUE		Automatic Passenger Counter	
Farmville Area Bus	On-Board Cameras *Estimated Cost:$84,000*		
Four County Transit		On-Board Cameras	
Fredericksburg Regional Transit	CAD/AVL *Estimated Cost:$375,000*		
Greater Lynchburg Transit Company	Full AVL/CAD with public info Paratransit with MDT's Run cutting / operations management (driver management also included)	Next Bus Arrival Display Real-Time Information to Info Mobile Devices	

	ITS DEPLOYMENT PLANS		
TRANSIT OPERATOR	**1 - 2 Years**	**2 - 6 Years**	**6+ Years**
	Estimated Cost: $910,000		
Greater Richmond Transit Company	New Paratransit Software / AVL New Fleet Maintenance System *Estimated Cost: $500,000*	Signal Priority - BRT Project Yard Management - New Facility Security Camera - New facility / transfer center	
Greater Roanoke Transit Company		CAD/AVL Scheduling & Run Cutting Software Automatic Pasenger Counters	
Greene County Transit, Inc.		CAD/AVL Maintenance Management Software Driver Assignment and Workforce Management Systems Automated Fare Collection Transit Trip Planner IVR Phone System	
Hampton Roads Transit	Bus Arrival Signs Real Time Web Wayside Security Cameras and Alarm LRT Transit Signal Priority Expand Mobile Device Support *Estimated Cost: $150,000* *(Bus Arrival Signs only)*		

	ITS DEPLOYMENT PLANS		
TRANSIT OPERATOR	**1 - 2 Years**	**2 - 6 Years**	**6+ Years**
Harrisonburg Department of Public Transportation	Automated Stop Announcement / Message Signs Automatic Passenger Counters Transit Trip Planner *Estimated Cost:$340,000*	CAD/AVL Scheduling & Run Cutting Software In-Station / Stop Security Camera Next Bus Arrival Display Real-Time Information on Web Real-Time Information on Mobile Device	
JAUNT Inc.	Cameras, Maintenance System AFC *Estimated Cost: $1,000,000*	Wayside Security Phased Traveler Info project	
King Street Trolley			Future ITS may be anticipated
Lake County Area Transit operator on Aging			Future ITS may be anticipated
Loudoun County Office of Transportation Services	Scheduling and Run Cutting Software Real-Time Information on Mobile Device *Estimated Cost: $150,000* *(Scheduling and Run Cutting Software only)*	Real-Time Information on Web Automated Stop Announcement / Message Signs	Next Bus Arrival Display
Mountain Empire Older Citizens Inc.			Future ITS may be anticipated

	ITS DEPLOYMENT PLANS		
TRANSIT OPERATOR	**1 - 2 Years**	**2 - 6 Years**	**6+ Years**
Petersburg Area Transit			Future ITS may be anticipated
Potomac & Rappahannock Transportation Commission (OmniRide)	On-Board Cameras (extend deployment across full fleet and increase functionality of existing systems) *Estimated Cost: $150,000*	CAD/AVL (to replace existing system) – includes automated stop announcement	Google Trip Planner Automatic Passenger Counters (on some vehicles) Real-Time Information (Web, IVR, Next Bus Arrival Display) Transit Signal Priority
Potomac & Rappahannock Transportation Commission (OmniLink)		CAD/AVL (to replace existing system) – includes automated stop announcement	Google Trip Planner Real-Time Information (Web, IVR, Next Bus Arrival Display) Transit Signal Priority
Pulaski Area Transit			Future ITS may be anticipated
RADAR	Maintenance Management Software Electronic Destination Signs On-Board Cameras *Estimated Cost:$380,000*	Automated Fare Collection	

	ITS DEPLOYMENT PLANS		
TRANSIT OPERATOR	**1 - 2 Years**	**2 - 6 Years**	**6+ Years**
STAR Transit			Future ITS may be anticipated
Town of Bluefield - Graham Transit			Future ITS may be anticipated
Town of Chincoteague			Future ITS may be anticipated
Virginia Railway Express	Trip Planner – VRE solution *Estimated Cost: $100,000*	Additional cameras at facilities	
Virginia Regional Transit	Yard Management System *Estimated Cost: $50,000*	CAD/AVL Automated Stop Announcement / Message Signs Automatic Passenger Counters On-Board Cameras In-Station / Stop Security Camera & Emergency Alarm Transit Trip Planner Next Bus Arrival Display Real-Time Information on Web & Mobile Device IVR Phone System	

	ITS DEPLOYMENT PLANS		
TRANSIT OPERATOR	**1 - 2 Years**	**2 - 6 Years**	**6+ Years**
Williamsburg Area Transport	CAD/AVL Next Bus Arrival Display Real-Time Information on Web *Estimated Cost:$200,000*	Real-Time Information on Mobile Device IVR Phone System Scheduling & Run Cutting Software Maintenance Management Software Driver Assignment and Workforce Management Systems Automatic Passenger Counters In-Station / Stop Security Cameras	
Winchester Transit	Scheduling and Run Cutting Software *Estimated Cost:$300,000*	CAD/AVL Automated Vehicle Annunciation Automatic Passenger Counters	
WMATA	Next Bus Arrival Display Parking Guidance System Pilot *Estimated Cost: $1.8 million*	Neutral Host (phone carriers in tunnels) Metro Channel Regional ITS Integration Stack Next Generation Bus Info (standardize AVL)	Capital Planning Decision Making

The cross-reference matrix in Exhibit 8-2 below provides a comprehensive overview of all transit operators and their existing and planned ITS deployments in the near-term and mid-term. This matrix provides a snapshot of each transit operator's level of ITS deployment at the end of 6 years. It can be shown that all ITS technologies are represented across the state and there is a reasonable balance between existing technologies and expectations for future deployments. At the end of 6 years, some operators will have an extensive suite of technologies, while others will still have opportunities for further ITS deployments. Only a few transit operators are not involved in ITS, and these are generally small rural transit services.

Exhibit 8-2: ITS Deployments in Next 6 Years

	ITS DEPLOYMENT PLANS (Within Next 6 Years)																
	On-Board Equipment						Central Systems Equipment							Wayside			
AGENCY NAME	CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Alexandria Transit Company	■	■				■		■		■					■		
Arlington Transit						▲	▲	■	▲	■	▲						
Bay Transit	■	■	▲			▲			■		■	■	■	■			
Blacksburg Transit							■	■							■	▲	▲
Blackstone Area Bus																■	
Bristol Transit																	
Charlottesville Transit Service									■			▲		▲			
Danville Transit																	
District Three Public Transit	■										■						
Fairfax County DOT (Connector)	▲	▲	▲			▲		▲		▲		■		▲	▲	▲	▲
Fairfax CUE		▲															
Farmville Area Bus						■											
Four County Transit						▲											
Fredericksburg Regional Transit	■																
Greater Lynchburg Transit Co	■									▲	■		■		▲		
Greater Richmond Transit Co	■			▲								■		▲		▲	
Greater Roanoke Transit Co	▲	▲									▲						
Greene County Transit, Inc.	▲				▲		▲		▲			▲	▲				
Hampton Roads				■				■		■					■	■	■
Harrisonburg Dept of Public Tran.	▲	■	■					▲	■	▲	▲				▲	▲	
JAUNT Inc.					■	■		▲		▲		■				▲	▲
King Street Trolley																	
Lake County Area Agency on Aging																	
Loudoun County Office of Tran. Services			▲					▲		■	■						
Mountain Empire Older Citizens Inc.																	
Petersburg Area Transit																	
PRTC OmniRide	▲					■											
PRTC OmniLink	▲																
Pulaski Area Transit																	
RADAR			■		▲	■						■					
STAR Transit																	
Town of Bluefield - Graham Transit																	
Town of Chincoteague																	
Virginia Railway Express									■							▲	
Virginia Regional Transit	▲	▲	▲			▲	▲	▲	▲	▲				■	▲	▲	▲
Williamsburg Area Transport	■	▲					▲	■		▲	▲	▲	▲		■	▲	
Winchester Transit	▲	▲	▲								■						
WMATA															■		

LEGEND	
Existing Deployment	
Near-Term Deployment (1-2 years)	■
Mid-Term Deployment (2-6 years)	▲

8.1 Opportunities to Coordinate Transit Operator Projects

As shown in the cross-reference table above (Exhibit 8-2), there are multiple transit operators looking to deploy similar ITS projects within the same time-frame. A coordinated deployment approach should be explored to capitalize on the benefits of cost reduction and interoperability of systems.

First, it is important to note that not all ITS technologies are equally suited to a shared procurement strategy. Technologies used internally, such as workforce management software, are well-suited for joint procurement since transit operators will likely have similar requirements across the board. Technologies that are public-facing, such as IVR and CAD/AVL require a high-degree of customization and are not appropriate for joint procurement. Instead, these technologies may benefit from a strategy of common specifications sections only.

The following sections describe opportunities to coordinate transit operator plans for near-term projects (within 1-2 years). Sections are categorized by on-board equipment, central system equipment, and wayside equipment. Each section begins with a table showing the viability of each technology type to a shared procurement, then describes strategies for coordination between specific transit operators

8.1.1 On-Board Equipment Coordinated Deployments

Exhibit 8-3 below shows the viability of shared procurement for the different on-board ITS technologies. In assessing the opportunities for joint procurement activities, it is important to consider the specific setting/characteristics of the stakeholders (e.g. campus settings).

Exhibit 8-3: Coordinated Procurement Viability for On-Board Equipment

On-Board Equipment		
ITS Technology	**Coordinated Procurement Viability**	**Technology-Specific Considerations**
CAD/AVL	Suitable for regionally connected agencies Similar size/type agencies Similar timeframe **Common specification sections only**	Transit operators will likely have specific requirements for a CAD/AVL system. CAD/AVL systems require a high degree of customization and may be suitable for common specification sections only.
APC	Similar timeframe **Common specifications sections** or **Joint procurement**	APC equipment can be procured as a stand-alone system or as a sub-system of CAD/AVL (avoids redundant components on the bus, e.g. GPS unit and WLAN for upload of count data). Transit operators will likely have similar requirements for APC.
AVA	Suitable for regionally connected agencies Similar timeframe **Common specifications sections** or **Joint procurement**	AVA equipment can be procured as a stand-alone system or as a sub-system of CAD/AVL (avoids redundant components on the bus, e.g. GPS unit and WLAN for download of announcement data). Transit operator will likely have similar requirements for AVA.

On-Board Equipment		
ITS Technology	**Coordinated Procurement Viability**	**Technology-Specific Considerations**
TSP	Similar timeframe **Common specifications sections** or **Joint procurement**	Transit operators will likely have similar requirements for TSP, but it will depend on existing traffic control equipment.
AFC	Suitable for regionally connected agencies Similar size/type agencies Similar timeframe **Common specifications sections** or **Joint procurement**	Transit operators will likely have specific requirements for AFC. There is opportunity for joint procurement if implementing a statewide or regional fare system.
On-Board Camera	Similar size/type agencies Similar timeframe **Common specifications sections** or **Joint procurement**	Cameras are usually procured as stand-alone systems, separate from a CAD/AVL system. Transit operators will likely have similar requirements for an on-board camera system.

CAD/AVL

As shown in Exhibit 8-2, there are 7 transit operators planning to deploy a CAD/AVL system in the near-term. These 5 transit operators are:

- Alexandria Transit Company (project underway);
- Bay Transit;
- District Three Public Transit;
- Fredericksburg Regional Transit;
- Greater Lynchburg Transit Company;
- Greater Richmond Transit Company; and
- Williamsburg Area Transport

CAD/AVL systems require a high degree of customization, but may be suitable for common procurement sections depending on transit operator size and service type. There is a potential for the strategy of common procurement sections for two groups: 1) District Three Public Transit, Fredericksburg Regional Transit and Greater Lynchburg Transit Company that are all small-fixed route services; and 2) Bay Transit and Williamsburg Area Transport that are both small demand-response services. Since the Alexandria deployment is already underway, this procurement could be reviewed for applicability or lessons learned in formulating the strategy for the other agencies.

Greater Richmond Transit Company was not included in a shared procurement strategy because they are looking to extend the existing AVL deployment across their paratransit fleet, and will likely procure equipment from the existing vendor.

Automatic Passenger Counters

There are also a few transit operators looking to deploy stand-along peripheral technologies without an existing CAD/AVL system. Alexandria Transit Company and Harrisonburg Department of Public Transportation are both deploying automatic passenger counters. Since these transit operators do not have a CAD/AVL system in place, there will not be customized integration requirements for the APC's. Joint procurement of the APC's could be considered.

On-Board Cameras

There are 5 transit operators deploying on-board camera systems. These transit operators are:

- Alexandria Transit Company (project underway);
- Farmville Area Bus;
- JAUNT Inc;
- Potomac & Rappahannock Transportation Commission (PRTC OmniRide); and
- RADAR

On-board camera systems can be suited to either common specification sections or joint procurements. There is the potential for joint procurement between Farmville Area Bus and RADAR as these transit operators are all small fixed-routed services and will likely have similar requirements for the camera system. Since the Alexandria deployment is already underway, this procurement could be reviewed for applicability or lessons learned in formulating the strategy for the other agencies.

RADAR has an existing CAD/AVL system, so integration of the camera system will need to be considered. JAUNT and PRTC are not included in the shared procurement strategy. JAUNT is a large demand-response service and will likely have different requirements for the camera system. PRTC is planning to extend the on-board camera system across their full fleet so it is expected that they will procure from the existing vendor.

8.1.2 Central System Equipment Coordinated Deployments

Exhibit 8- 4 below shows the viability of shared procurement for the different central system ITS technologies.

Exhibit 8-4: Coordinated Procurement Viability for Central System Equipment

Central Systems Equipment		
ITS Technology	**Coordinated Procurement Viability**	**Technology-Specific Considerations**
IVR	Suitable for regionally connected agencies Similar size/type agencies Similar timeframe	Transit operators will likely have specific requirements for an IVR system since it is public-facing.

Central Systems Equipment		
ITS Technology	**Coordinated Procurement Viability**	**Technology-Specific Considerations**
	Common specification sections only	
RT Web	Suitable for regionally connected agencies Similar size/type agencies Similar timeframe **Common specification sections only**	Transit operators will likely have specific requirements for displaying real-time information on the web since it is public-facing. There may be opportunities for neighboring agencies to procure through common specification sections.
Trip Plan	Suitable for regionally connected agencies Similar size/type agencies Similar timeframe **Common specification sections only**	Transit operators will likely have specific requirements for a Trip Planner since it is public-facing. There may be opportunities for neighboring agencies to procure through common specification sections.
Info Mobile Device	Similar timeframe **Common specifications sections** or **Joint procurement**	Transit operators will likely have similar requirements for pushing real-time information to mobile devices.
Sched & Run Cut	Similar size/type agencies Similar timeframe **Common specifications sections only**	Transit operators will likely have specific requirements for a Scheduling and Run Cutting software. This may be suitable for the approach of common specification sections.
Maint Mgmt	Similar timeframe **Common specifications sections** or **Joint procurement**	Transit operators will likely have similar requirements (used internally).
Driver Mgmt	Similar timeframe **Common specifications sections** or **Joint procurement**	Transit operators may have similar requirements or requirements may vary vastly.
Yard Mgmt	Similar size/type agencies Similar timeframe **Common specifications sections only**	Transit operators will likely have specific requirements for a Yard Management system depending on layout of facilities and size of fleet.

Maintenance Management Systems

As shown in Exhibit 8-2, there are multiple transit operators looking to deploy maintenance management systems. These transit operators are:

- Bay Transit;
- Fairfax Connector;
- Greater Richmond Transit Company;
- JAUNT; and
- RADAR.

Maintenance management software used internally by the transit operator lends itself well to joint procurements. Transit operators are likely to have similar needs irrespective of size, service type, and location.

Yard Management Systems

There are also several transit operators looking to deploy a yard management system. These transit operators are:

- Bay Transit; and
- Virginia Regional Transit.

Although a yard management system is an internal application and transit operators will have similar requirements, there is likely some level of customization required depending on vehicle storage procedures and storage layout. Furthermore, these transit operators are of varying service types and sizes. A joint procurement is not recommended, but there is potential for common specification sections.

Scheduling and Run Cutting Software

The following transit operators are deploying a scheduling & run cutting software:

- Bay Transit;
- District Three Public Transit;
- Greater Lynchburg Transit Company;
- Loudoun County Office of Transportation Services; and
- Winchester Transit.

Like the yard management system, scheduling and run cutting software is an application used internally with the base requirements likely being the same for most transit operators. It is a key component for transit operations, so transit operators will have their own custom requirements. The strategy of common procurement sections with a modular approach should be considered.

Real-Time Traveler Information on Web and Mobile Devices

There are several transit operators looking to deploy real-time information systems on the Internet and on mobile devices. These are public-facing systems that will require customization from each transit operator, but will benefit from a common presentation format.

Transit operators deploying real-time traveler information on the web include:

- Alexandria Transit Company;
- Arlington Transit;
- Blacksburg Transit;
- Hampton Roads; and
- Williamsburg Area Transport.

Of these transit operators, there are two groups of neighboring transit operators: 1) Arlington and Alexandria, and 2) Hampton Roads and Williamsburg. It would be beneficial to show shared service connections on a common map.

Transit operators deploying real-time traveler information on mobile devices are:

- Alexandria Transit Company;
- Arlington Transit;
- Blacksburg Transit;
- Hampton Roads; and
- Loudoun County Office of Transportation Services.

Similarly, common specifications should be considered by these transit operators.

8.1.3 Wayside Equipment Coordinated Deployments

Exhibit 8-5 below shows the viability of shared procurement for the different wayside ITS technologies.

Exhibit 8-5: Coordinated Procurement Viability for Wayside Equipment

Wayside Equipment		
ITS Technology	**Coordinated Procurement Viability**	**Technology-Specific Considerations**
Info Display	Suitable for regionally connected agencies Similar size/type agencies Similar timeframe **Common specifications sections** or **Joint procurement**	Transit operators will likely have similar requirements for displays showing next bus arrival times (typically 2-line LED signs). Some level of customization is required depending on data formats and communication methods.

Wayside Equipment		
ITS Technology	**Coordinated Procurement Viability**	**Technology-Specific Considerations**
Sec Cam	Similar size/type agencies Similar timeframe **Common specifications sections** or **Joint procurement**	Transit operators will likely have similar requirements.
Sec Alarm Button	Similar size/type agencies Similar timeframe **Common specifications sections** or **Joint procurement**	Transit operators will likely have similar requirements.

Next Bus Arrival Displays

As shown in Exhibit 8-2, there are multiple transit operators looking to deploy next bus arrival displays. These transit operators are:

- Alexandria Transit Company
- Blacksburg Area Transit;
- Hampton Roads;
- Williamsburg Area Transport; and
- WMATA.

There are several coordinated procurement strategies available for these transit operators. There is a potential for joint procurement for WMATA and Hampton Roads since they are both large fixed-route services and will likely have similar requirements. Also, there is the potential for joint procurement between Alexandria, Blacksburg, and Williamsburg, all small fixed-route transit operators.

Funding for ITS projects may be more readily available for large transit operators like WMATA and Hampton Roads. These transit operators should consider being the starting point for procurement of the next bus arrival displays, and allow for expansion of the procurement scope to allow the smaller transit operators of Alexandria, Blacksburg and Williamsburg to “piggyback” on the contract. Benefits of this open-ended procurement strategy include cost and time savings. A further case for this approach is that Hampton Roads and Williamsburg are neighboring transit operators, and as such, will provide the extra benefits of interoperability and consistent presentation of information at connection points.

8.2 Cross-Cutting and Research Efforts

Throughout the process of developing this report a number of cross-cutting and regional projects were identified that would provide benefit to multiple transit operators or entire regions. These projects will form part of the centralized aspect of the DRPT ITS program and consist of:

- State-wide 511 participation;
- Multimodal real-time traveler information for I-95 and I-395 corridors;

- Activity center traveler information display;
- Low cost bus location and real-time traveler information;
- Open data access;
- Communications assessment for transit;
- Fare integration; and
- Standards working group.

These projects are described in further detail in the following sections.

8.2.1 Statewide 511

VDOT has deployed a mature and advanced real-time traveler information system based around the nationally designated '511' three digit dialing code. A web site "VA511.com" has also been deployed. The system offers traffic, weather and construction information to users via telephone voice prompts and an interactive web site. Both of these information portals currently allow users to link out to transit operator call centers or web sites. However, there is no integration of data between the transit systems and the state-wide 511 system. A greater level of future integration could provide travelers with more comprehensive trip planning information in a one-stop portal and/or allow transit operators to leverage the extensive investment in the 511 telephone system. There is interest from a number of Virginia transit operators in offering real-time information via telephone and via text message.

There are several challenges in fully integrating transit information into the state-wide 511 including:

- How to effectively integrate the information into the current menu structure
- The data quality standards set by VDOT for the 511 service are high and work would need to be done to identify how external static and real-time transit data could be validated against such standards.
- The data transfer standards between systems will need to be developed.

The goal of this project will therefore be to explore further the potential for integration between the 511 system and transit. This project will explore the above areas and others that are identified to lay-out a road map for future activities that are determined to be viable. The project would need to take into account the fact that some transit operators already have their own interactive telephone systems and the need to keep human option for telephone access.

Term: Near-Term (1-2 years)

Budget: Scoping Study - $30,000

Critical Partners: VDOT

8.2.2 Multimodal Real-Time Traveler Information for I-95 and I-395 Corridors

The construction of high-occupancy toll lanes on I-95 and I-395 will not only benefit personal vehicles but will also provide a number of corridor based transit enhancements such as additional bus service and bus rapid transit (BRT). This creates a significant opportunity to provide advanced trip-planning and real-time information on a corridor-basis rather than transit operator or state-wide. The ITS functionality would assist travelers in choosing between modes on a particular day. Information could

be delivered pre-trip by a variety of means (text, web, phone) and signed in and around multi-mode interchanges and terminals.

This project would plan and ensure coordination of the deployment of information systems in concert with the transit system upgrades being deployed as part of these projects. While there is transit funding available in these projects, it will be important to provide early oversight to ensure ITS components are integrated into the overall plan.

Term: Planning – Near-Term (1-2 years); Deployment Oversight - Medium (2-6 years)

Budget: Planning - $20,000; Deployment Oversight - $50,000

Critical Partners: VDOT, Transurban, VRE, PRTC

8.2.3 Activity Center Traveler Information Display

Digital Signage is currently being deployed at the Tysons Corner Center Mall to display static and real-time, multi-modal traveler information. The focus is directing commuters on alternative methods for getting in and out of the mall and integrates traffic and transit information. The transit information is location centric in that it provides consolidated options across multiple transit operators for a variety of major destinations away from the mall. Local maps with transit routes and transit departure times to major destinations from the activity center are typically provided.

This project would leverage the work being done to develop these displays and compile information. Working with VDOT and other stakeholders, the project would seek to identify and expand the network of devices across the state. The project will consist of identification of other suitable candidate locations, development of criteria for site selection and deployment of devices and identification / compilation of information sources in the chosen locations. This will be an ongoing project to expand the network of devices. Since this project would be considered a TDM project, the activity center may be able to utilize TDM funds to fund ongoing operations and maintenance.

Term: Near-Term (1-2 years)

Budget: $150,000

Critical Partners: VDOT, Private sector activity centers

8.2.4 Low Cost Bus Location and Real-Time Traveler Information

DRPT funded a project to develop a proof-of-concept low cost bus location and traveler information system known as Martha that was demonstrated on the Falls Church George buses – known as MARTHA buses. The goal was to show that transit operators did not have to spend tens of thousands of dollars per bus to be able to provide their customers with reliable real-time information. The project successfully demonstrated that low cost cell phones could be used to track buses with sufficient accuracy to support real-time departure prediction information. The project included delivery of open source software for the complete system including in-vehicle devices, data collection modules, prediction algorithms, interactive telephone information delivery and an operator web application for entering data and controlling the system.

There has been significant interest in the deployment of parts or all of this software to various transit operators throughout the state. Before embarking on a broader deployment, a review of the ownership of the software is required along with identification of the best entity to host and manage the open source deployment. The development aspects of this project will then support the enhancement and deployment of the software to make it available to those transit operators not willing or able to invest in a fully featured high-cost AVL and traveler information system. This will be an ongoing project with all

enhancements continuing to expand the open-source code base to potentially benefit all transit operators deploying the system. Activities will be tailored to the needs of the transit operators wishing to participate in the system and would include:

- Determination of optimal open source ownership, distribution and management processes
- Assessment of suitability of existing in-vehicle devices or AVL systems;
- Assistance in procuring low-cost in-vehicle devices;
- Enhancement of data collection modules to work with new devices
- Enhancements to integrate with scheduling and assignment software that the transit operators may already have deployed.
- Assistance to the transit operator in deploying the software.
- Information dissemination enhancements such as web or Twitter.
- Maintenance support activities.
- Coordination of enhancements made by others that can contribute to the open-source code base.

Term: Near-Term (1-2 years) and Mid-Term (2-6 years)

Budget: $100,000 per year

Critical Partners: DRPT, Blacksburg Transit

8.2.5 Open Data Access

As ITS systems are more broadly deployed by transit and road transportation operators, there are increasing benefits in sharing information to enable coordinated transportation management and consolidated traveler information. In addition to a number of activities around the state that are working towards deploying consolidated information clearinghouses there is significant interest in open sharing of data by many transit agencies. Furthermore, Google transit has agreed to make the data it receives from agencies openly available in the standardized format.

Data sharing provides a means for regional transit operators to share schedule, bus locations and real-time traveler information with other systems and the private sector. Among other benefits, this can support the delivery of multi-service, multi-transit operator information to travelers. For example, electronic signage at a bus stop can utilize the shared data to provide departure times for all buses passing through that stop regardless of the transit operator. Such sharing could also be used for connection protection and multi-modal real-time trip planning. By making the data openly available, new and experimental applications will likely be developed by enthusiasts and private companies providing potentially significant added value to existing investments.

While a clearinghouse is being developed by VDOT and a regional clearinghouse is being deployed in the metropolitan Washington region know as RITIS, these system based approaches may constrain the openness of data access. Local transit operators are being encouraged to participate in local traffic operations centers (TOCs) by providing data on service disruptions to the state-wide VATraffic data collection and information sharing system and utilizing this system's information to determine impacts of traffic related incidents on their services. While the long term vision for RITIS is to be able to share real-time information across the region.

In this project DRPT would explore alternatives for open data sharing including making use of Google transit redistribution and participation in the ongoing clearinghouse efforts. This work should consider the interfaces and functionality for the Virginia Transit Data Archive and the Transit Equipment Database defined in the statewide architecture. Work would then be done with technology providers to develop a concept of operations as well as relevant information sharing agreements and data sharing standards to support the participation by Virginia transit operators. Ongoing support would be provided to encourage participation and provide the resources necessary to ensure newly deployed or upgraded systems could provide open data access.

Term: Near-Term (1-2 years) and Mid-Term (2-6 years)

Budget: $20,000 per year

Critical Partners: DRPT, VDOT, MWCOG/RITIS, transit operators

8.2.6 Communications Assessment for Transit

Wireless communications is the backbone of ITS because communications with the vehicles is central to the operation of a CAD system, AVL, and MDTs. Without the wireless communications technology, none of the other systems will function because they depend on communication with the vehicles. Communication from the dispatcher to the driver informs the driver where to go in the case of on-demand systems, and gives traffic information and other updates in the case of fixed routes. Communications from the vehicle provide real-time data for management, information and security purposes. The communications systems to support these ITS deployments have evolved considerably since ITS was first being deployed on Virginia transit operators in the early nineties. A wide variety of commercial and privately operated systems are available such as EVDO, GPRS, WiFi, and data transmission over private radio. New technologies such as WiMax and mesh networks provide additional options for consideration by transit operators.

This project will research the latest suite of communications options to provide a guide for transit operators to assist in the selection of appropriate technologies as well as providing a best estimate for future technologies. The current state of communications deployments by transit operators across the state and their near-term plans will be documented. Operators that need to make changes to their systems to comply with narrowbanding rules will be reviewed to identify whether there would be benefits to providing common resources to assist with conversions by 2013. The project will also look at other state-wide and regional groups to identify opportunities for communications resource sharing or where grouped procurements can help advance the deployment of transit ITS across the state. The end goal is to provide a strategic plan, much like this ITS plan, to define a road-map for near-term communications projects.

Term: Near-Term (1-2 years)

Budget: Research study - $75,000

Critical Partners: DRPT, consultant support, transit operators

8.2.7 Fare Integration

Coordinated fare collection systems are currently deployed in Northern Virginia through DRPT and NVTC's support in deploying the WMATA SmarTrip system on the regional buses. SmarTrip can now be used for fare payment across all bus operators in the region. However, there continues to be a cost barrier to agencies participating in this or similar systems. There is significant ongoing progress in the payment industry looking at use of Visa / MasterCard type contactless smartcards for fare payment. Other projects in the US and around the world have demonstrated the use of short range communications built into mobile phones as a convenient payment method. While additional operators

could take advantage of the current SmarTrip deployment, there is no clear path to state-wide fare integration that would permit the same electronic payment medium on all operators in the state. There is therefore a need for ongoing monitoring of the status of the electronic payment activities, current trends and challenges to integrated state-wide fare payment. This would include monitoring industry activity including the Smart Card Forum, APTA, ITS America and TCRP. Efforts in this area should be ongoing activities undertaken by DRPT staff with specific research projects developed as new potential technologies, institutional arrangements or regional needs are identified.

Term: Ongoing

Budget: $20,000 per year

Critical Partners: DRPT, WMATA, HRT, NVTC, consultant support

8.2.8 Standards Working Group

Throughout the planning process the need for workable and enforceable standards in various aspects of the ITS projects was identified. Rather than attempting to select and mandate standards as a specific project, this work activity seeks to build an ongoing process to support the deployment of standards based ITS projects across the state. The initial aspect of this activity will be to build a standards working group with DRPT, key transit operators and other related stakeholders from around the state. This working group would be tasked with identifying the best approach to encouraging standards usage across the state as well as defining a process to identify best practices, select standards, define contract language and provide guidance to agencies.

Term: Near-Term (1-2 years)

Budget: $50,000 for technical support to working group

Critical Partners: DRPT, operator stakeholders, Consultant support

8.2.9 Standards Working Group

In order to maximize deployment of certain ITS solutions, such as transit signal priority and multi-modal information displays, there is a need to coordinate with and promote the benefits of broader integration with external stakeholders. This is particularly true for transit signal priority activities that involve the local traffic agency in charge of signal control. In order to support these activities around the state, a working group will be established with participants representing the different stakeholders to identify how transit can best work with these agencies. For example, in considering transit signal priority, the working group will develop guidelines on what information needs to be provided by a transit agency in order for deployment to be warranted (i.e. x% of intersection person throughput is by bus, X% of transit subsidies would be saved for the jurisdiction if TSP was implemented, etc.) The products produced by the working group would be throughout the state to assist in broader deployment of transit ITS solutions.

Term: Near-Term (1-2 years)

Budget: $25,000 for technical support to working group

Critical Partners: DRPT, WMATA, VDOT, operator stakeholders, local jurisdiction representative, consultant support

8.3 Program Summary

The following table provides a summary of the coordinated ITS program described in the preceding sections.

Exhibit 8-6: Coordinated ITS Program Summary

COORDINATED ITS PROGRAM SUMMARY			
Project	**Timeline**	**Partners**	**Budget**
Opportunities to Coordinate Transit Operator Projects			
On-Board Equipment Coordinated Deployments	Near-Term (1-2 years)	CAD/AVL Common procurement sections (small fixed-route) - District Three, Fredericksburg, Greater Lynchburg Common procurement sections (small demand-response) - Bay Transit and Williamsburg	~ $2.5 million
		APC Joint procurement – Alexandria and Harrisonburg	
		On-Board Cameras Joint procurement –Farmville and RADAR	
Central System Equipment Coordinated Deployments	Near-Term (1-2 years)	Maintenance Management Systems Joint procurement – Bay Transit, Fairfax Connector, GRTC, JAUNT, RADAR	~ $3.5 million
		Yard Management Systems Common specification sections – Bay Transit, Virginia Regional Transit	

COORDINATED ITS PROGRAM SUMMARY			
Project	**Timeline**	**Partners**	**Budget**
		Scheduling and Run Cutting Software Common specification sections – Bay Transit, District Three, Greater Lynchburg, Loudoun, Winchester	
		Real-Time Traveler Info on Web Common specification sections – Alexandria, Arlington, Blacksburg, Hampton Roads, Williamsburg	
		Real-Time Traveler Info on Mobile Devices Common specification sections – Alexandria, Arlington, Blacksburg, Hampton Roads, Loudoun	
Wayside Equipment Coordinated Deployments	Near-Term (1-2 years)	Next Bus Arrival Display Joint procurement (large fixed-route) – WMATA and Hampton Roads Joint procurement (small fixed-route) – Blacksburg and Williamsburg Open-ended procurement to allow small fixed-route operators to "piggyback" on large fixed-route operators' joint procurement contract	~ $450,000
Cross-Cutting and Research Efforts			
Statewide 511	Near-Term (1-2 years)	VDOT	$30,000 (scoping study)
Multimodal Real-Time Traveler Info for I-95 and I-395 Corridors	Near-Term for planning (1-2 years) Mid-term for deployment oversight (2-6 years)	VDOT, Transurban, Virginia Railway Express, PRTC	$20,000 (planning) $50,000 (deployment oversight)

COORDINATED ITS PROGRAM SUMMARY			
Project	**Timeline**	**Partners**	**Budget**
Activity Center Traveler Information Display	Near-Term (1-2 years)	VDOT, private sector activity centers	$150,000
Low Cost Bus Location and Real-Time Traveler Information	Near-Term and Mid-Term (1-6 years)	DRPT, Blacksburg Transit	$100,000 per year
Open Data Access	Near-Term and Mid-Term (1-6 years)	DRPT, VDOT, MWCOG/RITIS, transit operators	$20,000 per year
Communications Assessment for Transit	Near-Term (1-2 years)	DRPT, consultant support, transit operators	$75,000 (research study)
Fare Integration	Ongoing	DRPT, WMATA, HRT, NVTC, consultant support	$20,000 per year
Standards Working Group	Near-Term (1-2 years)	DRPT, operator stakeholders, consultant support	$50,000

Where transit operators are pursuing similar technologies on a similar timeframe there is significant opportunity for collaboration or even joint procurement. However, the process utilized for this collaboration should follow the systems engineering approach detailed in Section 3.8 to ensure that each operator's needs can be met through the collaborative approach. Typically this could include development of concept of operations and high-level requirements for each operator by a single group. Sharing the resource should provide efficiencies over each agency pursuing this stage separately. For example, part of this effort will include review of industry products which will be common to both operators. Once the individual ConOps and requirements have been developed for the individual participants then the commonalities and differences between their needs can be clearly identified. This will help define the optimal level of collaboration for the remaining procurement and design steps can be best determined allowing the operators to undertake joint or individual effort as dictated by the underlying needs.

9 Project Finance

DRPT administers grant funds to support planning, capital and short-range operating expenses from federal and state sources. Typically, grants are used to fund the capital expenses and some period of initial operations for an ITS deployment. As such, transit operators will need to identify funding requirements for future operations and maintenance as part of the systems engineering process. Potential state funding sources include:

- Demonstration Program – with focus areas on ITS and Safety and Security. Assists communities in preserving and revitalizing public or private-public transportation service by implementing innovative projects. Covers up to 95% of eligible expenses Applications will be sought for Economic Stimulus Act funds in September of 2009. ITS projects are eligible for 100% funding of capital expenses.

- Capital Program supports costs borne by eligible recipients for public transportation capital projects. Covers up to 95% of eligible expenses.

- Operating Assistance Program supports costs borne by eligible recipients for operating related public transportation expenses. Can cover up to 95% of eligible expenses.

- Technical Assistance Program supports planning or technical assistance to help improve or initiate public transportation related services. State funds can cover up to 50% of eligible expenses. Federal funds may be provided to support 80% of project costs.

- Transportation Efficiency Improvement Funds (TEIF) Projects, supports Transportation Demand Management projects and programs that encourage the reduction of single occupant vehicle travel. Can cover up to 80% of eligible expenses.

- TDM/Commuter Assistance Program supports administration of existing or new local and regional Transportation Demand Management/Commuter Assistance programs. Covers up to 80% of eligible expenses

FTA runs several programs that could potentially support ITS planning and operation. These programs are targeted towards general planning and operation so only a portion of the funds may be used for ITS. These programs include:

- FTA Section 5303 - Metropolitan Planning

- FTA Section 5304 – Statewide Planning

- FTA Section 5307 – Small Urban Areas Program – Operating expenses

- FTA Section 5311 – Rural Areas – Operating and capital expenses with operating expenses having priority.

- FTA Section 5317 – New Freedom – Intended for programs that improve mobility for people with disabilities.

This strategic plan is the initial step in coordinating future ITS deployments across the state. As such, funding needs have only begun to emerge from the work undertaken. The plan should serve as a guide to selecting the projects for grant funding with some level of priority given to those projects identified as short term goals and those that can be undertaken through a coordinated approach. For example, Transit Development Plans (TDP) are important short-range planning tools for both transit operators and the DRPT. TDPs are six-year plans completed by each operator that identify their needs across the full range of its operations, such as service changes, expansions or cut backs, new personnel requirements, new passenger or maintenance facility requirements, and new vehicle and replacement vehicle requirements. Typically, ITS has not been included in TDPs being completed by Virginia transit operators, but given the importance of ITS in improved operations and DRPT's desire to advance ITS applications, as well as understand the financial requirements for ITS deployments throughout Virginia, ITS needs should be included in each operator's TDP and TDP updates. In this way, ITS needs will become part of the comprehensive identification of needs identified in each TDP. This would allow ITS funding to move from an ad-hoc to a more coordinated approach.

10 Future Process

It is important that this plan does not simply become a point-in-time snapshot of the state of transit ITS programs in Virginia. It is intended that this planning effort represent the commencement of an ongoing process to help facilitate the advancement of coordinated transit ITS initiatives throughout the state. With that in mind, it will be important to keep the plan evergreen through an annual review to verify progress against the plan, and to introduce adjustments to reflect the current progress and needs of the various stakeholder agencies.

In order to achieve this ongoing project coordination and update, an annual update of the transit operator forms developed as part of this plan is recommended. This process would occur as part of the annual TDP process and would seek updates on the current level of technology deployment as well as short term and long term ITS deployment plans with expected budget needs for the short term projects. The forms should be modified to solicit information on the planned funding source to allow DRPT to develop a more coordinated ITS funding program.

It is also important to look for venues where Virginia transit ITS stakeholders can continue to interact and provide an update of their current status. One potential is for ITS Virginia conferences to provide an opportunity to hold half day workshops for transit operators and vendor showcases.

APPENDIX A - ITS SURVEY RESULTS SUMMARY

ITS Survey Results

Number of Agencies Responded: 23

Transit Agency Name:	Person Completing Survey/Contact Name:	Contact Name Phone Number:
AASC/Four County Transit	Joe Ratliff	276 964-7180
Alexandria Transit Company	Al Himes	703 370-3274 x613
Arlington Transit	Kelley MacKinnon	703 228-7547
Bay Transit	Melissa Phillips	804 758-2386
Blacksburg Transit	Tim Witten	540 443-7100 x2053
Charlottesville Transit Service	Eric A. Smith	434 970-3892
City of Fairfax CUE Bus	Alexis Verzosa	703 385-7889
Fairfax County DOT (Fairfax Connector)	Carlton Campbell	703 324-1126
Greater Roanoke Transit Company	Chip Holdren	540 982-0305
Greene County Transit, Inc.	Ginger Morris	434 985-5205
GRTC Transit System	Paul Kotula	804 474-9315
Hampton Roads Transit	David Sullivan	757 222-6121
Harrisonburg	Reggie Smith	540 432-0496
JAUNT, Inc.	Kevan Danker	434 296-3184 x102
Lake Area Bus	Robin J. McGee/Johnny Cleaton	434 447-7661
Loudoun County Office of Transportation Services	Nancy Gourley	703 737-8384
Potomac & Rappahannock Transportation Commission	Eric Marx	703 580-6117
RADAR-UHSTS, Inc.	Curtis Andrews	540 343-1721 x102
Rockbridge Area Transportation System	Tim Root	540 463-3346
Virginia Railway Express	Christine Hoeffner	703 838-5442
Virginia Regional Transit	Michael J. Socha	540 338-1610
Williamsburg Area Transit Authority	Richard Drumwright	757 220-5547
WMATA	Sean Kennedy	571 334-3623

Scheduling and Run-Cutting Software Summary Results

Do you currently deploy Scheduling & Run Cutting Software?		
Answer Options	**Response Percent**	**Response Count**
Yes	52%	12
No	48%	11

If you answered YES, please answer the following questions:		
Answer Options	**Response Percent**	**Response Count**
Please name vendor/product for fixed route.	67%	8
Please name vendor/product for paratransit.	83%	10
Is the software used for all services (e.g. fixed route, paratransit)? List all services for which software is used.	75%	9
answered question		10
skipped question		13

Transit Agency Name	Please name vendor/product for fixed route.	Please name vendor/product for paratransit.	Is the software used for all services (e.g. fixed route, paratransit)? List all services for which software is used.
Harrisonburg		Para Plan	
AASC/Four County Transit	CORI, INC TRACI SOFTWARE		
JAUNT, Inc.		Trapeze/PASS	Paratransit, Employment Runs
Alexandria Transit Company	The Master Scheduler / Scheduler Masters, Inc.	n/a	
RADAR-UHSTS, Inc.		RouteMatch	Demand Response
Fairfax County DOT (Fairfax Connector)	Trapeze	Trapeze	all services
Potomac & Rappahannock Transportation Commission	Trapeze	Trapeze FLEX	Fixed route and flex
GRTC Transit System	Giro/Hastus	RouteMatch/Navitrans	Yes fixed route and paratransit
WMATA	Trapeze/ FX and OPS	Trapeze/ PASS	Yes, fixed route and paratransit
Virginia Regional Transit		SHAH SoftWare	Demand & ADA
Blacksburg Transit	Mentor Streets	Mentor Streets	ALL
Hampton Roads Transit	Giro/Hastus		Fixed route

If you answered NO, please add a check next to the appropriate response (please check only one response)		
Answer Options	**Response Percent**	**Response Count**
a.We plan on implementing within the next two years.	15%	2
b.We plan on implementing at some point in the future after two years.	46%	5
c.We do not anticipate implementing.	38%	5
answered question		12
skipped question		10

Comments

Transit Agency Name	Response Text
Loudoun County Office of Transportation Services	Currently scoping software needs.
GRTC Transit System	We will probably look for a replacement for Navitrans. RouteMatch bought Navitrans and will eventually stop supporting it.
Lake Area Bus	We are a one bus system so the need for advance technology is not needed at this time nor cost efficient.

Automatic Vehicle Location and/or Computer Aided Dispatch Capabilities Summary Results

Do you currently deploy Automatic Vehicle Location and/or Computer Aided Dispatch Capabilities?		
Answer Options	**Response Percent**	**Response Count**
Yes	52%	12
No	48%	11

If you answered YES, please answer the following questions:		
Answer Options	**Response Percent**	**Response Count**
Please name vendor/product for fixed route.	91%	10
Please name vendor/product for paratransit.	55%	6
Is the software used for all services (e.g. fixed route, paratransit)? List all services for which software is used.	100%	11
As part of these capabilities do you have Mobile Data Terminals on your vehicles?	91%	10
If you do have Mobile Data Terminals please name the vendor.	73%	8
	answered question	**12**
	skipped question	**11**

Transit Agency Name	Please name vendor/product for fixed route.	Please name vendor/product for paratransit.	Is the software used for all services? List all services for which software is used.	As part of these capabilities do you have Mobile Data Terminals on your vehicles?	If you do have Mobile Data Terminals please name the vendor.
JAUNT, Inc.		Mentor Engineering/XGATE/MDC	Paratransit & Employment Runs	Yes	Mentor Engineering
RADAR-UHSTS, Inc.		Mentor & RouteMatch	Demand Response	Yes	Mentor
Potomac & Rappahannock Transportation Commission	AirTrak and Nextel	GreyHawk via AT&T with gateway to Trapeze	Yes all services but 2 totally different systems	Yes, on flex route buses	GreyHawk
Loudoun County Office of Transportation Services	Air-Trak				
GRTC Transit System	Clever Devices	RouteMatch/Navitrans	Both fixed route and paratransit	Yes	Mentor
Virginia Railway Express	TRIPS		All VRE locomotives		
Charlottesville Transit Service	Connexionz	na	fixed route	no	
Arlington Transit	Connectionz - Real Time		fixed route	no	
WMATA	Motorola/ OrbCAD (Orbital Sciences)	Mentor Engineering	Fixed Route, transit police and non-revenue fleet; paratransit uses Mentor	Yes	Motorola/ OrbCAD (Orbital Sciences)
Blacksburg Transit	Mentor Streets		Fixed Route	Yes	Mentor Rangers
Hampton Roads Transit	Continental/Transitmaster		fixed route	yes	Continental (formerly Siemens VDO)
City of Fairfax CUE Bus	Nextbus, Luminator		Fixed Route	yes	Nextbus, Luminator

If you answered NO, please add a check next to the appropriate response (please check only one response)		
Answer Options	**Response Percent**	**Response Count**
a.We plan on implementing within the next two years.	27%	3
b.We plan on implementing at some point in the future after two years.	45%	5
c.We do not anticipate implementing.	27%	3
	answered question	**11**
	skipped question	**12**

Comments

Transit Agency Name	Response Text
GRTC Transit System	Not all paratransit vehicles have MDT's. We will be looking, in the next two years, to equip all vehicles.
Virginia Railway Express	TRIPS software is a custom application developed for VRE.
Arlington Transit	Not sure on the Mobile Data on board although all buses are GPS so it they transmit back to dispatch & websites
Lake Area Bus	The cost is far to expensive for our small system

Maintenance Management Systems Summary Results

Do you currently deploy a Maintenance Management System?		
Answer Options	**Response Percent**	**Response Count**
Yes	57%	13
No	43%	10

If you answered YES, please answer the following questions:		
Answer Options	**Response Percent**	**Response Count**
Please name vendor/product for fixed route.	92%	12
Please name vendor/product for paratransit.	69%	9
Is the system used for all services (e.g. fixed route, paratransit)? List all services for which software is used.	46%	6
	answered question	**13**
	skipped question	**10**

Transit Agency Name	Please name vendor/product for fixed route.	Please name vendor/product for paratransit.	Is the system used for all services (e.g. fixed route, paratransit)? List all services for which software is used.
Harrisonburg	Flagship	Flagship	
AASC/Four County Transit	CORI, INC TRACI SOFTWARE		
Alexandria Transit Company	RTA Fleet managemnet Software / Ron Turley Associates	n/a	
Rockbridge Area Transportation System		HMS (Home maintenance system) cheap package to log activity	
Potomac & Rappahannock Transportation Commission	Datastream MP7i - no real-time/remote monitoring	Same	Yes
Loudoun County Office of Transportation Services	Faster		
GRTC Transit System	RTA (Ron Turley @ Associates	RTA (Ron Turley @ Associates	Yes all services
Virginia Railway Express	MicroMain		All commuter rail equipment
Greater Roanoke Transit Company	Ron Turley & Assoc.		
WMATA	IBM/ Maximo	n/a	Fixed route
Virginia Regional Transit	SHAH	SHAH	
Blacksburg Transit	Sungard Fleet Manager	Sungard Fleet Manager	All
Hampton Roads Transit	Infor/Spear 2000 (Formerly Hansen/Spear)		Fixed Route

If you answered NO, please add a check next to the appropriate response (please check only one response)		
Answer Options	**Response Percent**	**Response Count**
a.We plan on implementing within the next two years.	44%	4
b.We plan on implementing at some point in the future after two years.	33%	3
c.We do not anticipate implementing.	22%	2
	answered question	**9**
	skipped question	**14**

Comments

Transit Agency Name	Response Text
GRTC Transit System	We will potentially looking at a replacement to the current system to improve work flow and integrate into our Great Plains ERP system.
Greater Roanoke Transit Company	Contract with RADAR to provide paratransit service, we do not service those vehicles.
Charlottesville Transit Service	We have SAP, but it does not work like we'd want a maintenance management system to work.
Arlington Transit	Our Copntractor is responsibile for this. Our "new" buses are equipped though with fault codes for particular maintenance problems which can be read via probe, etc.
Lake Area Bus	We get tracked of vehicle maintenance manually

Driver Assignment and Workforce Management Systems Summary Results

Do you currently deploy Driver Assignment and Workforce Management Systems?		
Answer Options	**Response Percent**	**Response Count**
Yes	39%	9
No	61%	14

If you answered YES, please answer the following questions:		
Answer Options	**Response Percent**	**Response Count**
Please name vendor/product for fixed route.	78%	7
Please name vendor/product for paratransit.	67%	6
Is the system used for all services (e.g. fixed route, paratransit)? List all services for which software is used.	78%	7
	answered question	**9**
	skipped question	**14**

Transit Agency Name	Please name vendor/product for fixed route.	Please name vendor/product for paratransit.	Is the system used for all services (e.g. fixed route, paratransit)? List all services for which software is used.
AASC/Four County Transit	SAME		
JAUNT, Inc.		Trapeze PASS	Paratransit & Employment Runs
Alexandria Transit Company	The Master Scheduler / Schedule Masters, Inc.		
RADAR-UHSTS, Inc.		RouteMatch	Demand Response
Potomac & Rappahannock Transportation Commission	Combination of TransTrack and Trapeze	Same	Yes
GRTC Transit System	Giro/Hastus	RouteMatch/Navitrans	fixed route and paratransit
WMATA	Trapeze/OPS	Mentor Engineering	fixed route
Blacksburg Transit	When to Work	When to Work	ALL
Hampton Roads Transit	Giro/Hastus		fixed route

If you answered NO, please add a check next to the appropriate response (please check only one response)		
Answer Options	**Response Percent**	**Response Count**
a.We plan on implementing within the next two years.	8%	1
b.We plan on implementing at some point in the future after two years.	15%	2
c.We do not anticipate implementing.	77%	10
	answered question	**13**
	skipped question	**10**

Comments

Transit Agency Name	Response Text
GRTC Transit System	Within the next two years, we will be looking to replace Navitrans
Virginia Railway Express	Amtrak is the contractor that operates VRE trains (engineers and conductors). They utilize their own system for assigning personnel.
Arlington Transit	This is contractor based responsbility
Lake Area Bus	We do this manually

Yard Management System Summary Results

Do you currently deploy a Yard Management System?		
Answer Options	**Response Percent**	**Response Count**
Yes	9%	2
No	87%	21

If you answered YES, please answer the following questions:		
Answer Options	**Response Percent**	**Response Count**
Please name vendor/product for fixed route.	100%	3
Please name vendor/product for paratransit.	33%	1
Is the system used for all services (e.g. fixed route, paratransit)? List all services for which software is used.	67%	2
	answered question	**3**
	skipped question	**20**

Transit Agency Name	Please name vendor/product for fixed route.	Please name vendor/product for paratransit.	Is the system used for all services (e.g. fixed route, paratransit)? List all services for which software is used.
Potomac & Rappahannock Transportation Commission	Not really sure what Yard Management is		
Virginia Railway Express	MicroMain		All commuter rail equipment
WMATA	RPM (Rail)	n/a	fixed route rail

If you answered NO, please add a check next to the appropriate response (please check only one response)		
Answer Options	**Response Percent**	**Response Count**
a.We plan on implementing within the next two years.	11%	2
b.We plan on implementing at some point in the future after two years.	16%	3
c.We do not anticipate implementing.	68%	13
	answered question	**19**
	skipped question	**4**

Comments

Transit Agency Name	Response Text
Virginia Railway Express	Plan to implement in the coming year.
Arlington Transit	Again, although Real Time is both a management of bus tool as well as a dispatch management tool anything over and above this is contractor responsibility
WMATA	Bus uses put out sheets, rail uses RPM rail performance monitor that is custom made

Automated Stop Announcement/Message Signs Summary Results

Do you currently deploy Automated Stop Announcement / Message Signs?		
Answer Options	**Response Percent**	**Response Count**
Yes	39%	9
No	61%	14

If you answered YES, please answer the following questions:		
Answer Options	**Response Percent**	**Response Count**
Please name vendor/product.	100%	9
Please provide the percentage of fixed route vehicles that are equipped.	100%	9
	answered question	**9**
	skipped question	**14**

Transit Agency Name	Please name vendor / product.	Please provide the percentage of fixed route vehicles that are equipped.
GRTC Transit System	Clever Devices	95%
Virginia Railway Express	See other comments	Audio in 100% passenger coaches; message signs in approx. 65% of fleet
Greater Roanoke Transit Company	Digital Recorders/Twin Vision	74%
Charlottesville Transit Service	Digital Recorders	25%
Arlington Transit	Digital Recorders/Twin Visions	28%
WMATA	Clever Devices/ AVA	100%
Williamsburg Area Transit Authority	GFI	100%
Blacksburg Transit	Luminator	100%
City of Fairfax CUE Bus	Luminator	100%

If you answered NO, please add a check next to the appropriate response (please check only one response)		
Answer Options	**Response Percent**	**Response Count**
a.We plan on implementing within the next two years.	21%	3
b.We plan on implementing at some point in the future after two years.	36%	5
c.We do not anticipate implementing.	43%	6
	answered question	**14**
	skipped question	**9**

Comments

Transit Agency Name	Response Text
GRTC Transit System	It's not 100% because we just received 18 new buses. They will be equipped within the next couple of months.
Virginia Railway Express	Announcements through central audio system in each passenger cab car; message signs integral to Sumitomo passenger cabs/coaches
Charlottesville Transit Service	We would like to retro fit the manual stop announcement buses with automated systems. We are specing our future buses with the DSB automatec system.
Arlington Transit	We will be adding 12 more equipped buses later this year (on order) that will bring us up to over 50%
Lake Area Bus	We are a one bus rural demand response system

Automatic Passenger Counters Summary Results

Do you currently deploy Automatic Passenger Counters?		
Answer Options	**Response Percent**	**Response Count**
Yes	22%	5
No	78%	18

If you answered YES, please answer the following questions:		
Answer Options	**Response Percent**	**Response Count**
Please name vendor/product.	100%	5
Please provide the percentage of vehicles that are equipped.	100%	5
	answered question	**5**
	skipped question	**18**

Transit Agency Name	Please name vendor / product.	Please provide the percentage of vehicles that are equipped.
GRTC Transit System	Clever Devices	18%
Arlington Transit	Part of Digital Recorders package, APC Counters and UTA softwars	20%
WMATA	Clever Devices/ APC	50% approximately
Blacksburg Transit	UTA	100 - Fixed Route buses
Hampton Roads Transit	Continental/Iris	15%

If you answered NO, please add a check next to the appropriate response (please check only one response)		
Answer Options	**Response Percent**	**Response Count**
a.We plan on implementing within the next two years.	17%	3
b.We plan on implementing at some point in the future after two years.	28%	5
c.We do not anticipate implementing.	56%	10
	answered question	**18**
	skipped question	**5**

Comments

Transit Agency Name	Response Text
GRTC Transit System	Our new 18 buses will have passenger counters added.
Charlottesville Transit Service	We would if we can get some grant money!
Arlington Transit	We will similar equip new buses as they are spec'd

Wireless Local Area Network Summary Results

Do you currently deploy a Wireless Local Area Network?		
Answer Options	**Response Percent**	**Response Count**
Yes	26%	6
No	74%	17

If you answered YES, please answer the following questions:		
Answer Options	**Response Percent**	**Response Count**
Please name vendor/product.	83%	5
Please provide the percentage of vehicles that are equipped.	83%	5
	answered question	**6**
	skipped question	**17**

Transit Agency Name	Please name vendor / product.	Please provide the percentage of vehicles that are equipped.
Greater Roanoke Transit Company	Routers with Verizon wireless cards	12%
GRTC Transit System	Uptime Solutions / Verizon Wireless	only 6 vehicles
WMATA	Multiple	100%
Hampton Roads Transit	Cisco/Aeronet	100%
Blacksburg Transit	Citizens Wireless	22%

If you answered NO, please add a check next to the appropriate response (please check only one response)		
Answer Options	**Response Percent**	**Response Count**
a.We plan on implementing within the next two years.	12%	2
b.We plan on implementing at some point in the future after two years.	35%	6
c.We do not anticipate implementing.	53%	9
	answered question	**17**
	skipped question	**6**

Comments

Transit Agency Name	Response Text
Greater Roanoke Transit Company	We only have wi-fi on our 5 Smartway commuter buses. We do not have it on fixed route buses.
Arlington Transit	This is being discussed as a possibility
GRTC Transit System	Only vehicles that travel long distances (commuter routes) utilizing coach buses
WMATA	3 networks. Clever Devices, Cubic Farebox, Motorola Radio

Vehicle “Black Box” Monitoring System Summary Results

Do you currently deploy a Vehicle “Black Box” Monitoring System (similar to aircraft flight recorder)?		
Answer Options	**Response Percent**	**Response Count**
Yes	9%	2
No	91%	21

If you answered YES, please answer the following questions:		
Answer Options	**Response Percent**	**Response Count**
Please name vendor/product.	100%	2
Please provide the percentage of vehicles that are equipped.	100%	2
	answered question	**2**
	skipped question	**21**

Transit Agency Name	Please name vendor/product.	Please provide the percentage of vehicles that are equipped.
Virginia Railway Express	Pulse and Bach-Simpson	100% locomotives and cab cars
Hampton Roads Transit	Continental/Transitmaster (Vehicel Health Monitoring)	80%

If you answered NO, please add a check next to the appropriate response (please check only one response)		
Answer Options	**Response Percent**	**Response Count**
a.We plan on implementing within the next two years.	5%	1
b.We plan on implementing at some point in the future after two years.	24%	5
c.We do not anticipate implementing.	71%	15
	answered question	**21**
	skipped question	**2**

Comments

Transit Agency Name	Response Text
Virginia Railway Express	Pulse in locomotives; Bach-Simpson in cab cars
Arlington Transit	Again, in discussion as we grow but budget is a problem

Electronic Destination Signs Summary Results

Do you currently deploy Electronic Destination Signs?		
Answer Options	**Response Percent**	**Response Count**
Yes	70%	16
No	30%	7

If you answered YES, please answer the following questions:		
Answer Options	**Response Percent**	**Response Count**
Please name vendor/product.	100%	16
Please provide the percentage of vehicles that are equipped.	93%	15
	answered question	**16**
	skipped question	**7**

Transit Agency Name	Please name vendor / product.	Please provide the percentage of vehicles that are equipped.
Charlottesville Transit Service	Luminator	100%
Alexandria Transit Company	Twin Vision / Digital Recorders, Inc.	100%
Fairfax County DOT (Fairfax Connector)	Illuminator	100%
Potomac & Rappahannock Transportation Commission	TwinVision	Same
Harrisonburg	Luminator	100%
Virginia Railway Express	Sumitomo	All Sumitomo passenger coaches, approx. 65% of fleet
Greater Roanoke Transit Company	Twin Vision	100%
Loudoun County Office of Transportation Services	Luminator	100%
Arlington Transit	Twin Vision and Luminator	100%
GRTC Transit System	Luminator and Twin Vision	100%
WMATA	Luminator/Twin Vision destination signs	100%
Virginia Regional Transit	Illuminator	50%
Williamsburg Area Transit Authority	Luminator	
Blacksburg Transit	Luminator	100%
Hampton Roads Transit	Continental/Transitmaster	100%
City of Fairfax CUE Bus	Luminator	100%

If you answered NO, please add a check next to the appropriate response (please check only one response)		
Answer Options	**Response Percent**	**Response Count**
a.We plan on implementing within the next two years.	14%	1
b.We plan on implementing at some point in the future after two years.	0%	0
c.We do not anticipate implementing.	86%	6
	answered question	**7**
	skipped question	**16**

Comments

Transit Agency Name	Response Text
Virginia Railway Express	Electronic destination signs are provided integral to the Sumitomo passenger coaches
Charlottesville Transit Service	We're planning on switching to Twin Vision signs that are a part of the Digital Recorder empire.
GRTC Transit System	The majority of the fleet is Twin Vision

Driver Cameras Summary Results

Do you currently deploy Driver Cameras?		
Answer Options	**Response Percent**	**Response Count**
Yes	36%	8
No	64%	14

If you answered YES, please answer the following questions:		
Answer Options	**Response Percent**	**Response Count**
Please name vendor/product.	100%	8
Please provide the percentage of vehicles that are equipped.	88%	7
	answered question	**8**
	skipped question	**15**

Transit Agency Name	Please name vendor/product.	Please provide the percentage of vehicles that are equipped.
Harrisonburg	Safety Vision	80%
Potomac & Rappahannock Transportation Commission	DriveCam - plan on equipping local fleet, hopefully w/ real-time remote monitoring	80%
Loudoun County Office of Transportation Services	DriveCam	87.5%
Charlottesville Transit Service	Safety Vision	100%
Greater Roanoke Transit Company	Safety Vision	100%
GRTC Transit System	GE/MobileView	100%
WMATA	GE/Digital Video Camera	100%
Williamsburg Area Transit Authority	Apollo	

If you answered NO, please add a check next to the appropriate response (please check only one response)		
Answer Options	**Response Percent**	**Response Count**
a.We plan on implementing within the next two years.	21%	3
b.We plan on implementing at some point in the future after two years.	36%	5
c.We do not anticipate implementing.	43%	6
	answered question	**14**
	skipped question	**9**

Comments

Transit Agency Name	Response Text
Charlottesville Transit Service	Seems to do the trick.
Arlington Transit	Discussing and actually hosting a demo on property soon. Again budgets are flat.

Transit Signal Priority Summary Results

Are your vehicles currently equipped for Transit Signal Priority?		
Answer Options	**Response Percent**	**Response Count**
Yes	9%	2
No	91%	21

If you answered YES, please answer the following questions:		
Answer Options	**Response Percent**	**Response Count**
Please name vendor/product.	100%	2
Please list the percentage of vehicles that are equipped.	100%	2
Please identify your traffic agency partners	100%	2
	answered question	**2**
	skipped question	**21**

Transit Agency Name	Please name vendor/product.	Please list the percentage of vehicles that are equipped.	Please identify your traffic agency partners
Fairfax County DOT (Fairfax Connector)	unknown	25	vdot
WMATA	opticom in VA and EMTRAC in DC	5%	VDOT, DDOT

If you answered NO, please add a check next to the appropriate response (please check only one response)		
Answer Options	**Response Percent**	**Response Count**
a.We plan on implementing within the next two years.	0%	0
b.We plan on implementing at some point in the future after two years.	30%	6
c.We do not anticipate implementing.	70%	14
	answered question	**20**
	skipped question	**3**

Comments

Transit Agency Name	Response Text
Arlington Transit	We are looking to add to certain prime corridors as it becomes available.
WMATA	Installation for testing only.

Registering Fareboxes Summary Results

Are your vehicles currently equipped with Registering Fareboxes?		
Answer Options	**Response Percent**	**Response Count**
Yes	52%	12
No	48%	11

If you answered YES, please answer the following questions:		
Answer Options	**Response Percent**	**Response Count**
Please name vendor/product.	100%	12
Are the fareboxes registering or validating?	91%	11
What type of fare media is supported by these fareboxes? (e.g. magnetic stripe, smart card)	91%	11
	answered question	**12**
	skipped question	**11**

Transit Agency Name	Please name vendor/product.	Are the fareboxes registering or validating?	What type of fare media is supported by these fareboxes? (e.g. magnetic stripe, smart card)
Alexandria Transit Company	Cubic/GFI (National Capitol Region SmarTrip Program)	Validating	Smart Card
Fairfax County DOT (Fairfax Connector)	GFI	both	smartcard
Potomac & Rappahannock Transportation Commission	Cubic/GFI	Validating	SmartCard
Loudoun County Office of Transportation Services	GFI Odyssey	validating	SmartCard, coin, bills
Greater Roanoke Transit Company	GFI	Registering	Magnetic Stripe
Charlottesville Transit Service	CFI CENTSaBILL	registering	coins, bill and tickets
Arlington Transit	Cubic/GFI	Yes	SmartCard, cash
GRTC Transit System	GFI/CENTSaBILL	Registering	Magnetic stripe
WMATA	Cubic/ NextFare 3	Registering	smart card, cash and magnetic stripe
Williamsburg Area Transit Authority	GFI		
Hampton Roads Transit	GFI-Genfare - Odyssey and Centsabill	50% validating (Odyssey) 50% registering (Centsabill)	magnetic strip (currently used) - smart card supported
City of Fairfax CUE Bus	Cubic/GFI	Registering	Smart card

If you answered NO, please add a check next to the appropriate response (please check only one response)		
Answer Options	**Response Percent**	**Response Count**
a.We plan on implementing within the next two years.	0%	0
b.We plan on implementing at some point in the future after two years.	27%	3
c.We do not anticipate implementing.	73%	8
	answered question	**11**
	skipped question	**12**

Comments

Transit Agency Name	Response Text
Charlottesville Transit Service	We would like to upgrade our system to validating fare boxes if some grant money is available.
Arlington Transit	This is part of a Regional System

On-Board Security Cameras Summary Results

Do you currently deploy On-Board Security Cameras?		
Answer Options	**Response Percent**	**Response Count**
Yes	39%	9
No	61%	14

If you answered YES, please answer the following questions:		
Answer Options	**Response Percent**	**Response Count**
Please name vendor/product.	100%	9
Are vehicles for all services provided by your system (e.g. fixed route, paratransit) equipped with on-board security cameras? Please list all types of vehicles that are equipped	89%	8
Please provide percentage of fixed route vehicles in fleet equipped with on-board security cameras	89%	8
Please provide percentage of paratransit vehicles in fleet equipped with on-board security cameras	67%	6
	answered question	**9**
	skipped question	**14**

Transit Agency Name	Please name vendor/product.	Are vehicles for all services provided by your system equipped with on-board security cameras?	Please provide percentage of fixed route vehicles in fleet equipped with on-board security cameras	Please provide % of paratransit vehicles in fleet equipped with on-board security cameras
Harrisonburg	Safety Vision			
Greater Roanoke Transit Company	Safety Vision	Fixed route, Commuter bus	100%	
Charlottesville Transit Service	Safety Vision	Gillig, New Flyer, Opus, Trolley, BOC	100%	na
GRTC Transit System	GE/MobileView	Fixed Route	100%	0%
WMATA	GE Security	No, fixed route only	50% of bus	0% (paratransit vehicles just have drive cam)
Virginia Regional Transit	Twin-Vision	Large Coaches	5%	
Williamsburg Area Transit Authority	Apollo	Buses	100%	0%
Blacksburg Transit	GE; Seon; Safetyvision	Paratransit	0%	50%
Hampton Roads Transit	Safety Vision	fixed route, shuttle and passenger ferry	100%	0%

If you answered YES, please answer the following questions:			
Answer Options	**Yes**	**No**	**Response Count**
Are the camera images viewable by police or control center?	2	6	8
Are the camera images either monitored real-time or reviewed regularly?	3	5	8
		answered question	**8**
		skipped question	**15**

If you answered NO, please add a check next to the appropriate response (please check only one response)		
Answer Options	**Response Percent**	**Response Count**
a.We plan on implementing within the next two years.	21%	3
b.We plan on implementing at some point in the future after two years.	29%	4
c.We do not anticipate implementing.	50%	7
	answered question	**14**
	skipped question	**9**

Comments

Transit Agency Name	Response Text
Greater Roanoke Transit Company	RADAR operates our paratansit service
Charlottesville Transit Service	We view as needed for complaints and accidents.
Arlington Transit	If budget allows we would like to have as much technology as possible on board.
GRTC Transit System	Images are not real time. Police have frequently asked for footage. We burn them DVD's. When an accident, incident or complaint is received, the DVR is pulled and footage is stored for the corresponding issue. There is a control procedure associated with any DVR and footage.
WMATA	If there is an incident the images are downloaded from the specific bus and viewed. The images are not viewed on a real time basis.

In-Station/Stop Security Cameras Summary Results

Do you currently deploy In-Station/Stop Security Cameras?		
Answer Options	**Response Percent**	**Response Count**
Yes	22%	5
No	78%	18

If you answered YES, please answer the following questions:		
Answer Options	**Response Percent**	**Response Count**
Please name vendor/product.	100%	5
Please provide percentage of stations/stops in the system equipped with security cameras.	100%	5
answered question		5
skipped question		18

Transit Agency Name	Please name vendor/product.	Please provide percentage of stations/stops in the system equipped with security cameras.
Arlington Transit	Panasonic	1 station equipped with 8 cameras
Potomac & Rappahannock Transportation Commission	VicoNet throughout PRTC Transit Center	Only one station/stop
Virginia Railway Express	Indigo Vision	28%; 5 stations
Charlottesville Transit Service	Vector Security -	one at the Downtown Transit Station
WMATA	Pelco	N/A

If you answered YES, please answer the following questions:			
Answer Options	**Yes**	**No**	**Response Count**
Are the camera images viewable by police or control center?	3	2	5
Are the camera images either monitored real-time or reviewed regularly?	4	1	5
answered question			5
skipped question			18

If you answered NO, please add a check next to the appropriate response (please check only one response)		
Answer Options	**Response Percent**	**Response Count**
a.We plan on implementing within the next two years.	0%	0
b.We plan on implementing at some point in the future after two years.	41%	7
c.We do not anticipate implementing.	59%	10
answered question		17
skipped question		6

Comments

Transit Agency Name	Response Text
Virginia Railway Express	Camera feed provided in VRE Communications Center.
Charlottesville Transit Service	Reviewed only if there is an incident.
GRTC Transit System	If we get a transfer center, we will equip it with security cameras.
WMATA	In station (rail) images are viewable in real time.
Williamsburg Area Transit Authority	Plan to implement at Transfer Centers only

In-Station/Stop Emergency Alarms Summary Results

Do you currently deploy In-Station/Stop Emergency Alarms?		
Answer Options	**Response Percent**	**Response Count**
Yes	14%	3
No	86%	19

If you answered YES, please answer the following questions:		
Answer Options	**Response Percent**	**Response Count**
Please name vendor/product.	67%	2
Please provide percentage of stations/stops in the system equipped with security alarms.	67%	2
	answered question	**3**
	skipped question	**20**

Transit Agency Name	Please name vendor/product.	Please provide percentage of stations/stops in the system equipped with security alarms.
Harrisonburg	Phone at to PD Dispatch at JMU	
Arlington Transit	Talk-A-Phone	1 station equipped with 3
Virginia Railway Express		22%; 4 stations

If you answered NO, please add a check next to the appropriate response (please check only one response)		
Answer Options	**Response Percent**	**Response Count**
a.We plan on implementing within the next two years.	0%	0
b.We plan on implementing at some point in the future after two years.	28%	5
c.We do not anticipate implementing.	72%	13
	answered question	**18**
	skipped question	**5**

Comments

Transit Agency Name	Response Text
Virginia Railway Express	Call buttons linked to answering service. No direct connection to 911.
GRTC Transit System	If we get a transfer center, we will equip it with emergency alarms.
WMATA	In rail stations only, emergency phones and push buttons (blue light)

Transit Trip Planner Summary Results

Do you currently deploy a Transit Trip Planner?		
Answer Options	**Response Percent**	**Response Count**
Yes	36%	8
No	64%	14

If you answered YES, please answer the following question:		
Answer Options	**Response Percent**	**Response Count**
Please name vendor/product.	100%	8
	answered question	**8**
	skipped question	**15**

Transit Agency Name	Please name vendor/product.
Alexandria Transit Company	The Master Scheduler / Schedule Masters, Inc.
Potomac & Rappahannock Transportation Commission	AITG - same firm that builds our website
Loudoun County Office of Transportation Services	Google
GRTC Transit System	Ontira
WMATA	Trapeze/Mantech
Williamsburg Area Transit Authority	Goggle
Blacksburg Transit	Google
Hampton Roads Transit	Google/Google Maps

If you answered NO, please add a check next to the appropriate response (please check only one response)		
Answer Options	**Response Percent**	**Response Count**
a.We plan on implementing within the next two years.	23%	3
b.We plan on implementing at some point in the future after two years.	31%	4
c.We do not anticipate implementing.	46%	7
	answered question	**14**
	skipped question	**9**

Comments

Transit Agency Name	Response Text
Virginia Railway Express	Coordinating with DRPT for future use of Google product. WMATA Trip Planner includes VRE trains.
Charlottesville Transit Service	We are working with Google Transit
Arlington Transit	At this point we are small enough to do it internally, although as we grow, I would not rule out any technology

Next Bus Arrival Displays/Annunciation at Stations or Stops Summary Results

Do you currently deploy Next Bus Arrival Displays/Annunciation at Stations or Stops?		
Answer Options	**Response Percent**	**Response Count**
Yes	18%	4
No	82%	18

If you answered YES, please answer the following question:		
Answer Options	**Response Percent**	**Response Count**
Please name vendor/product.	100%	4
	answered question	**4**
	skipped question	**19**

Transit Agency Name	Please name vendor/product.
Virginia Railway Express	See comments
Charlottesville Transit Service	Connexionz - LCD monitors at the Downtown Transit Station
Arlington Transit	Real Time Connectionz
City of Fairfax CUE Bus	Nextbus

If you answered NO, please add a check next to the appropriate response (please check only one response)		
Answer Options	**Response Percent**	**Response Count**
a.We plan on implementing within the next two years.	39%	7
b.We plan on implementing at some point in the future after two years.	28%	5
c.We do not anticipate implementing.	33%	6
	answered question	**18**
	skipped question	**5**

Comments

Transit Agency Name	Response Text
Virginia Railway Express	Video displays at stations and station announcements are manually activated by VRE staff.
Charlottesville Transit Service	We have BusFinders at 25 stops that tell passengers when the next bus will arrive (how many minutes until its arrival) - we have 5 more on order
Arlington Transit	WE have what they call "bus finders" on a portion of our stops.
WMATA	Are in process of implementing NextBus...hopefully by end of Spring

Real Time Information Available On-Line Summary Results

Do you currently deploy Real Time Information Available On-Line?		
Answer Options	**Response Percent**	**Response Count**
Yes	15%	4
No	85%	18

If you answered YES, please answer the following question:		
Answer Options	**Response Percent**	**Response Count**
Please name vendor/product.	100%	4
	answered question	**4**
	skipped question	**19**

Transit Agency Name	Please name vendor/product.
Virginia Railway Express	Rail Time
Charlottesville Transit Service	Connexionz
WMATA	INOVA/ PIDS (Passenger Information Display System) - Custom made
City of Fairfax CUE Bus	Nextbus

If you answered NO, please add a check next to the appropriate response (please check only one response)		
Answer Options	**Response Percent**	**Response Count**
a.We plan on implementing within the next two years.	44%	8
b.We plan on implementing at some point in the future after two years.	28%	5
c.We do not anticipate implementing.	33%	6
	answered question	**18**
	skipped question	**5**

Comments

Transit Agency Name	Response Text
Virginia Railway Express	Custom application utilizing TRIPS data and Microsoft MapPoint
Charlottesville Transit Service	We have a stop stop map that gives the minutes away for eaqch bus route at every stop. We also have a bus stop search page that does the same.
Arlington Transit	We are working to incorporate this on our Real Time, so this is in the works.
GRTC Transit System	Part of the Clever Device project.
WMATA	Rail system only

Real Time Information Available through Personal Communications Devices Summary Results

Do you currently deploy Real Time Information Available through Personal Communications Devices?		
Answer Options	**Response Percent**	**Response Count**
Yes	18%	4
No	82%	18

If you answered YES, please answer the following question:		
Answer Options	**Response Percent**	**Response Count**
Please name vendor/product.	100%	4
answered question		**4**
skipped question		**19**

Transit Agency Name	Please name vendor/product.
Charlottesville Transit Service	Connexionz IVR
Arlington Transit	Real Time Connectionz
WMATA	INOVA/ PIDS (Passenger Information Display System) - Custom made
City of Fairfax CUE Bus	Nextbus

If you answered NO, please add a check next to the appropriate response (please check only one response)		
Answer Options	**Response Percent**	**Response Count**
a.We plan on implementing within the next two years.	32%	6
b.We plan on implementing at some point in the future after two years.	32%	6
c.We do not anticipate implementing.	37%	7
answered question		**19**
skipped question		**4**

Comments

Transit Agency Name	Response Text
Virginia Railway Express	Persons with internet access via PDA can access Rail Time on device via the VRE web site.
Charlottesville Transit Service	Call #, enter bus stop ID #, and a digital voice tells the minutes away for each bus at that stop within 30 minutes.
Arlington Transit	This will be activated along with the website. Our www.arlingtontransit.com already has this ability and Real Time will be incorporated.
GRTC Transit System	Part of the Clever Device Project
WMATA	Rail system only.

Interactive Voice Response Telephone System Summary Results

Do you currently deploy a Interactive Voice Response Telephone System?		
Answer Options	**Response Percent**	**Response Count**
Yes	30%	6
No	70%	16

If you answered YES, please answer the following question:		
Answer Options	**Response Percent**	**Response Count**
Please name vendor/product.	100%	6
	answered question	**6**
	skipped question	**17**

Transit Agency Name	Please name vendor/product.
JAUNT, Inc.	LogicTree IVR
Fairfax County DOT (Fairfax Connector)	Contracted services with Technology Solutions Providers Inc
Potomac & Rappahannock Transportation Commission	Trapeze/Voice Genie
Virginia Railway Express	Interaction Client
Charlottesville Transit Service	Connexionz
WMATA	Logic Tree/ IVR

If you answered NO, please add a check next to the appropriate response (please check only one response)		
Answer Options	**Response Percent**	**Response Count**
a.We plan on implementing within the next two years.	6%	1
b.We plan on implementing at some point in the future after two years.	44%	7
c.We do not anticipate implementing.	50%	8
	answered question	**16**
	skipped question	**7**

Comments

Transit Agency Name	Response Text
Virginia Railway Express	Interaction Client is used for VRE internal phone system.
Charlottesville Transit Service	We contract this out, but are researching buying a system for in-house.
Arlington Transit	I do not rule anything out. This is a possibility as time goes by.

Voice Transmissions Summary Results

Do you currently deploy Voice Transmissions?		
Answer Options	**Response Percent**	**Response Count**
Yes	57%	12
No	43%	9

If you answered YES, please answer the following questions for fixed route:		
Answer Options	**Response Percent**	**Response Count**
Please identify the system coverage area	100%	9
Please identify the number of vehicles covered	78%	7
Please identify the system bandwidth	89%	8
Please identify the system owner	100%	9
Please identify whether the system is leased or shared	78%	7
If lease or shared please identify from, or with, whom	44%	4
	answered question	**9**
	skipped question	**14**

Transit Agency Name	Please identify the system coverage area	Please identify the number of vehicles covered	Please identify the system bandwidth	Please identify the system owner	Please identify whether the system is leased or shared	If lease or shared please identify from, or with, whom
Alexandria Transit Company	City of Alexandria	62		City of Alexandria		
Potomac & Rappahannock Transportation Commission	Throughout PRTC local and commuter service area	122 (100%)	900 mhz?	Nextel	Commercial, shared	Nextel
Loudoun County Office of Transportation Services	Everywhere	Not tied to vehicles; tied to drivers	Nextel digital	Nextel - Sprint	shared	Nextel
Virginia Railway Express	TBD	TBD	TBD	TBD	TBD	TBD
Charlottesville Transit Service	all of the city of charlottesville and Albemarle County	40	800	Region	buy radios, share frequencies and maintenance	Motorola
GRTC Transit System	Richmond Metro Area	180	25khz	GRTC Transit System	Owned	
WMATA	Greater Washington DC Metro area	800 rail, 1,500 buses, 500 non-revenue, 100 police	160 Mhz, 490 Mhz	WMATA	Owned	
Blacksburg Transit	???		UHF - 450s	Blacksburg Transit		
Hampton Roads Transit	100% HRT Service Area 370 sq miles		4 - 12.5k UHF data channels (digital voice)	HRT	no	

If you answered YES, please answer the following questions for paratransit (if applicable):		
Answer Options	**Response Percent**	**Response Count**
Please identify the system coverage area	100%	5
Please identify the number of vehicles covered	80%	4
Please identify the system bandwidth	80%	4
Please identify the system owner	80%	4
Please identify whether the system is leased or shared	40%	2
If lease or shared please identify from, or with, whom	20%	1
answered question		**5**
skipped question		**18**

Voice Transmissions Summary Results (continued….)

Transit Agency Name	Please identify the system coverage area	Please identify the number of vehicles covered	Please identify the system bandwidth	Please identify the system owner	Please identify whether the system is leased or shared	If lease or shared please identify from, or with, whom
JAUNT, Inc.	Charlottesville and 5 surrounding Counties	69	NA	JAUNT	Owned	
RADAR-UHSTS, Inc.	Cities of Roanoke & Salem, Town of Vinton and Roanoke County	55	168.675	RADAR- UHSTS, INC.		
Bay Transit	Northern Neck, Middle Peninsula and New Kent and Charles City	50	between 136-174 mhz	Bay Aging/Bay Transit		
Potomac & Rappahannock Transportation Commission	Same as above					
GRTC Transit System	Richmond Metro Area	80	25khz	Radio Communications of Virginia	Leased	Radio Communications of Virginia

If you answered NO, please add a check next to the appropriate response (please check only one response)		
Answer Options	**Response Percent**	**Response Count**
a.We plan on implementing within the next two years.	20%	2
b.We plan on implementing at some point in the future after two years.	20%	2
c.We do not anticipate implementing.	60%	6
answered question		**10**
skipped question		**13**

Comments

Transit Agency Name	Response Text
Virginia Railway Express	Plan to implement 2-way VHF radio communications system
Charlottesville Transit Service	We share the 800 system with fire & police in Charlottesville and Albamarle county and school buses in Albemarle County, along with several gov't agencies in the area.
Arlington Transit	If we can find the money, this is a big priority for our system.
GRTC Transit System	Coverage - 30 mile radius "Richmond Metro Area"
Lake Area Bus	We are a Demand Response System with wheelchair capabilities. We have two way radio system

Data Transmissions Summary Results

Do you currently deploy Data Transmissions?		
Answer Options	**Response Percent**	**Response Count**
Yes	33%	7
No	67%	14

If you answered YES, please answer the following questions for fixed route:		
Answer Options	**Response Percent**	**Response Count**
Please identify the system coverage	83%	5
Please identify the system bandwidth	100%	6
Please identify the system owner	100%	6
Please identify whether the system is leased or shared	83%	5
If lease or shared please identify from, or with, whom	17%	1
answered question		6
skipped question		17

Transit Agency Name	Please identify the system coverage	Please identify the system bandwidth	Please identify the system owner	Please identify whether the system is leased or shared	If lease or shared please identify from, or with, whom
Arlington Transit	Arlington County	FSK	Com Com	No	
Potomac & Rappahannock Transportation Commission	Only data is GPS trasnmitted via Nextel throughout service area - same system as previous page				
GRTC Transit System	Richmond Metro Area	25khz	GRTC Transit System	Owned	
Charlottesville Transit Service	our service area	450	Connexionz	buy the radios, lease the repeater	Piedmont Electronics
WMATA	Greater Washington DC Metro area	490 Mhz	WMATA	owned	
Blacksburg Transit		UHF - 450s	Blacksburg Transit		
Hampton Roads Transit	100% HRT Service Area 370 sq miles	2 - 12.5k UHF data channels	HRT	No	

If you answered YES, please answer the following questions for paratransit (if applicable):		
Answer Options	**Response Percent**	**Response Count**
Please identify the system coverage	100%	4
Please identify the system bandwidth	75%	3
Please identify the system owner	100%	4
Please identify whether the system is leased or shared	100%	4
If lease or shared please identify from, or with, whom	50%	2
answered question		4
skipped question		19

Transit Agency Name	Please identify the system coverage	Please identify the system bandwidth	Please identify the system owner	Please identify whether the system is leased or shared	If lease or shared please identify from, or with, whom
JAUNT, Inc.	Charlottesville and 5 surrounding Counties	NA (36 Kbs?)	JAUNT	Wireless - Owned, 4-wire land line leased	Sprint
RADAR-UHSTS, Inc.	Cities of Roanoke & Salem, Town of Vinton and Roanoke County		RADAR-UHSTS, INC.	OWNED	
Potomac & Rappahannock Transportation Commission	Prince William County	???	AT&T	Commercial, shared	AT&T
GRTC Transit System	Nationwide	19.2 kbps	Nextel	Leased	

Data Transmissions Summary Results (continued….)

If you answered NO, please add a check next to the appropriate response (please check only one response)		
Answer Options	**Response Percent**	**Response Count**
a.We plan on implementing within the next two years.	21%	3
b.We plan on implementing at some point in the future after two years.	29%	4
c.We do not anticipate implementing.	50%	7
	answered question	**14**
	skipped question	**9**

Comments

Transit Agency Name	Response Text
Arlington Transit	I again do not rule anything out for our fixed route system. Its more budget than what we would like to do.
GRTC Transit System	Paratransit fixed systemequipment owned by Sprint-Nextel. Packet data service leased to GRTC. Subscriber equipment owned by GRTC
Charlottesville Transit Service	IT's part of the real time AVL system

Priorities Summary Results

For those ITS systems that you identified the need to deploy, please provide a ranking for deploying your top ten priorities. Please start with 1 as the highest priority and end with 10 as the lowest priority. For all other systems, please leave the space next to that system blank.				
Answer Options	**Response Average**	**Response Total**	**Response Count**	**Number of '1s' (Highest Priority)**
a.Scheduling and Run Cutting Software ----------	2.2	13	6	4
b.Automatic Vehicle Location and/or Computer Aided Dispatch Capabilities -------	1.4	7	5	4
c.Maintenance Management Systems ----------	2.8	14	5	1
d.Driver Assignment and Workforce Management Systems ----------	3.8	15	4	0
e.Yard Management System ----------	5.7	57	10	3
f.Automated Stop Announcement /Message Signs ----------	4.5	36	8	2
g.Automatic Passenger Counters ----------	3.6	25	7	1
h.Wireless Local Area Network ----------	6.0	54	9	0
i.Vehicle “Black Box” Monitoring System (similar to aircraft flight recorder) ------	5.7	34	6	0
j.Electronic Destination Signs ----------	5.3	21	4	0
k.Transit Signal Priority ----------	5.3	63	12	1
l.Registering Farebox ----------	4.2	25	6	2
m.Smart Card Fare Payment ----------	3.0	21	7	2
n. On-Board Security Cameras ----------	4.1	37	9	1
o.In-Station/Stop Security Cameras ----------	7.1	57	8	0
p.Security Systems – In-Station/Stop Emergency Alarm ----------	7.4	52	7	0
q.Transit Trip Planner ----------	4.3	26	6	1
r.Next Bus Arrival Displays/Annunciation at Station or Stops ----------	5.8	64	11	1
s.Real Time Information Available On-Line ----------	3.9	39	10	1
t.Real Time Information Available through Personal Communications Devices ----	5.4	49	9	2
u.Interactive Voice Response Telephone ----------	4.9	39	8	1
v.Radio Voice Transmissions ----------	2.7	16	6	2
w.Radio Data Transmissions ----------	3.5	14	4	1
		answered question		**18**
		skipped question		**5**

Comments

Transit Agency Name	Response Text
Virginia Railway Express	Implementation of the yard management system is proceeding. Voice transmission project planned. Are evaluating options to bring smart card payment technology to the VRE fare collection system that is compatible witht the WMATA SmarTrip technology and/or allows access to the WMATA SmartBenefits program. Will expand station cameras as funding is available
GRTC Transit System	Real Time information was not ranked because it's part of a current project.
Williamsburg Area Transit Authority	We have gestering fareboxes and automated announcements and destination. Need to upgrade due to reliability problems.

General Questions Summary Results

Please rate how prepared your agency is to support the procurement and deployment of ITS technologies		
Answer Options	**Response Percent**	**Response Count**
a.We have qualified staff on-board to support procurement and deployment and are ready to begin right now.	29%	6
b.We have some staff on board to support procurement and deployment but will require additional expertise before we can begin.	57%	12
c.We do not currently have staff expertise and would not be able to support procurement and deployment at this time.	14%	3
	answered question	**21**
	skipped question	**2**

Please rate how prepared your agency is to manage new implemented technology		
Answer Options	**Response Percent**	**Response Count**
a.We have qualified staff on-board to manage implemented ITS technologies.	29%	6
b.We have some staff on board to manage implemented ITS technologies but will require additional expertise before we can begin.	57%	12
c.We do not currently have staff expertise and would not be able to manage ITS technology at this time.	14%	3
	answered question	**21**
	skipped question	**2**

Please rate how prepared your agency is to manage data generated from new ITS technologies		
Answer Options	**Response Percent**	**Response Count**
a.We have qualified staff on-board to manage data generated from ITS technologies.	24%	5
b.We have some staff on board to manage data generated from ITS technologies but will require additional expertise before we can begin to effectively manage the data.	52%	11
c.We do not currently have staff expertise and would not be able to manage data generated from ITS technology.	24%	5
	answered question	**21**
	skipped question	**2**

Please rate the anticipated benefits/costs of ITS technologies implemented to date		
Answer Options	**Response Percent**	**Response Count**
a.We have experienced very high benefits relative to the costs of ITS technologies implemented to date.	52%	11
b.The benefits and costs of ITS technologies implemented to date are about even.	24%	5
c.The costs of ITS technologies implemented to date outweigh the benefits of the technology.	24%	5
	answered question	**21**
	skipped question	**2**

Please rate the feedback you have received from customers on currently deployed ITS systems		
Answer Options	**Response Percent**	**Response Count**
a.Customer feedback has been very positive.	72%	13
b.Customer feedback has been neutral with neither very positive or very negative feedback received.	28%	5
c.Customer feedback has been negative regarding currently deployed technology.	0%	0
	answered question	**18**
	skipped question	**5**

General Questions Summary Results (continued….)

Please identify important lessons learned from the implementation of ITS technologies currently in use in your system.	
Answer Options	**Response Count**
	17

Transit Agency Name	Response Text
JAUNT, Inc.	IVR system for disabled/elderly needed to be later generations with higher degree of accuracy for voice recognition (VR). There should be VR and touchtone options for every appropriate customer response section. When implementing major ITS package, Spend more time planning than you think you need, more time training people, prepare for implementation and move quickly to implement all facets of project.
Rockbridge Area Trans. System	Push-to-talk phones are working fine. Investigation of a scheduling/dispatching system (routematch) shows little benefit and unaffordable. It is possible that, after entering rural public transit, we'd need to share a maintenance facility
Bay Transit	We look forward to researching and implementing many new technologies. We are a very rural transit system that is a demand-response with potential for some fixed routes in the future.
Greene County Transit, Inc.	n/a demand response
Fairfax County DOT (Fairfax Connector)	ITS Plan requires updating
Potomac & Rappahannock Transportation Commission	Count on lots of staff involvement in ITS projects. Utilize independent external technical help to write a tight spec. but realize there will be still many unanticipated/unaddressed issues. Get project manager (PM) buy-in on timeline. Use one PM who's in charge and is central point of contact. Make sure your contract has "teeth" and require PM to do likewise with subcontracts to help ensure timely performance. Expect project to still take 2-3X expectations
Loudoun County OTS	Fareboxes - have buses configured with dedicated power with switch for farebox. GPS - 18" whip antenna is too tall for commuter coach. Any ITS technologies need to be open source.
Virginia Railway Express	It always takes longer than anticipated and can cost more than initially identified. Also, rapidly changing technology can reduce the lifespan/desireability of a solution given the often long procurement cycle.
Arlington Transit	Training, traning and more training.
GRTC Transit System	Data can be overwhelming. Project managment is a key component to get buy in with new technology.
Lake Area Bus	n/a
Charlottesville Transit Service	Working with IT dept and vendors is challenging. Be prepared to spend a lot more time that anticipated to implement and monitor IT technologies.
WMATA	ITS implementations have to be carefully planned and excuted. Systems integrations are important but challenging.
Virginia Regional Transit	Destination signs have been very helpful to end users. Video cameras inside our buss have helped us with a few recent incidents.
Williamsburg Area Transit Authority	Need to have better maintenance and training to support technologies. Inordinate amount of time spent in keeping registering fareboxes operational.
Blacksburg Transit	TIME, everything will take longer than you expect. SPECS, Good Specs will save you time and questions. Staff traininig, not just abou the system, but what to do with the data you collect.
City of Fairfax CUE Bus	Power sources for the technologies need to be worked out at the location.

Please identify requests you have received from customers for desired deployment of ITS technologies.	
Answer Options	**Response Count**
	15

Transit Agency Name	Response Text
JAUNT, Inc.	Internet access to bus availability, Automated Fare media, those who did use our IVR system (shutting down due to lack of usage.) used it frequently and now will all be using our call center.
Bay Transit	None to date
Greene County Transit, Inc.	none
Fairfax County DOT (Fairfax Connector)	Next bus/AVL and real time information, alert system
Potomac & Rappahannock Transportation Comm.	Real-time bus information
Loudoun County Office of Transportation Services	SmarTrip Card autoload. Real time bus location information.
Virginia Railway Express	Trip planner; WMATA trip planner and demonstrations of Google product do not always provide most direct routing. Are reviewing ongoing development of the Google technology.
Arlington Transit	Our customers want the ability to know where a vehicle is. Our "ART Alerts" subscribers, website info, they look to at stations/stops as being a key area for further "live information"
GRTC Transit System	Biggest is real time information. Our current project with Clever Devices will address this.
Lake Area Bus	n/a
Charlottesville Transit Service	Real time map on web site viewable by all browsers. More bus arrival technology at the bus stops. Automated stop announcement system - 25% of fleet, drivers and customers want more!
WMATA	Incident communications, trip planning info into Google
Virginia Regional Transit	Travel trip helper and next bus announcements at key transfer centers
Williamsburg Area Transit Authority	Automated Vehicle Location to help with customer schedule information.
Blacksburg Transit	Trip Planner, Real-time bus data
City of Fairfax CUE Bus	IVR

Please identify the number of maintenance/garage facilities within your system:

Answer Options	Response Count
	17
answered question	17
skipped question	6

Transit Agency Name	Response Text
JAUNT, Inc.	1 Maintenance facility, 1 Admin location, 20 "Garage" facilities including up to 19 out-based driver home-based locations
Bay Transit	One under construction
Greene County Transit, Inc.	none, use County maintenance facility
Fairfax County DOT (Fairfax Connector)	2 operational and a third coming online
Arlington Transit	1
Loudoun County Office of Transportation Services	One
Virginia Railway Express	2 maintenance/storage yards owned by VRE, 1 owned by contractor (Amtrak)
Potomac & Rappahannock Transportation Commission	1
GRTC Transit System	1 - but we will be moving to 2 within the next couple of months
Lake Area Bus	n/a
Charlottesville Transit Service	one
WMATA	10 bus, 10 rail
Virginia Regional Transit	2
Williamsburg Area Transit Authority	one leased
Blacksburg Transit	1
Hampton Roads Transit	3
City of Fairfax CUE Bus	1

Please outline any plans for expansion over the next three years, outlined by number of vehicles to be added at each maintenance facility/garage.	
Answer Options	**Response Count**
	15
answered question	**15**
skipped question	**8**

Transit Agency Name	Response Text
JAUNT, Inc.	Based on possible expansion of service throughout service area and beyond we could see an increase of approximately 5 - 10 vehicles.
Bay Transit	We are working towards construction of an administrative/maintenance facility in Warsaw, Virginia.
Lake Area Bus	n/a
Fairfax County DOT (Fairfax Connector)	pending transit development plan completion
Potomac & Rappahannock Transportation Commission	After expansion planned for later this month to handle overcrowding (4 additional commuter trips), plan to add upt to 20 hours/year for overcrowding and 3 buses. No service expansion planned at this time.
Loudoun County Office of Trans. Services	A minimum of eleven
Virginia Railway Express	No expansion planned. Nearing completion of passenger coach replacement project, replaces 71(40+ yrs old) coaches. In the process of replacing existing(30+ yrs old) locos w/ new equipment.
Arlington Transit	The economy may dictate this from a budget standpoint. But we have enough route demand that we could double our fleet.
GRTC Transit System	Expansion is continually be planned. No specific vehicle count has been determined, but we continually look for ways to expand to the commuter market.
Greene County Transit, Inc.	n/a
Charlottesville Transit Service	We are going to be building a new maintenance/operations center. No expansion planned now unless we become a regional authority.
WMATA	300 buses, 200 rail cars throughout system
Virginia Regional Transit	We will compelte our secnd facility in March, 2009. At that time, we will begin contrcution of our third faiclity. At this time it is too difficult to anticpate the number of vehciles we will be adding.
Williamsburg Area Transit Authority	Seeking AVL/GPS grant opportunities for fleet. Identifying staff support required for ITS plan
City of Fairfax CUE Bus	None

APPENDIX B - TRANSIT OPERATOR PROGRAM FORMS

Transit Operator: Alexandria Transit Company

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
○	○	○	○	●	○	○	○	●	●	●	●	●	○	○	○	○
Projected Deployment (next 6 years)																
●	◐	○	○	●	●	○	●	●	●	●	●	●	○	●	○	○
Typical Industry Deployment Path																
●	●	●	○	◐	●	◐	●	◐	●	●	◐	◐	◐	◐	○	○

Note: Trip planner is provided through WMATA

Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
CAD/AVL (fax info system, web info, and text message interface)	$700,000	✓		
On-board cameras (full fleet)		✓		
APC (9 vehicles)		✓		
Next Bus Arrival Display (pilot)		✓		
Next Bus Arrival Display (roll-out)			✓	

Participants / Resource Sharing

DASH

WMATA (central database for transit info)

Barriers

Interoperability between devices

Slow pace of progress at WMATA

Notes: Fixed-Route (Small – 57 vehicles); completed in 2009-02-27 workshop and validated by Al Himes in 2009-06-11 workshop

Transit Operator: Arlington Transit

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
●	◐	◐	○	●	○	○	○	○	○	○	○	○	○	●	○	○
Projected Deployment (next 6 years)																
●	◐	◐	○	●	●	●	●	●	●	●	○	○	○	●	○	○
Typical Industry Deployment Path																
●	◐	●	○	◐	◐	◐	◐	◐	○	●	◐	◐	◐	◐	○	○

Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
Real-Time Information on Web		✓		
Real-Time Information on Mobile Device		✓		
IVR Phone System			✓	
On-Board Cameras			✓	
Transit Trip Planner			✓	
Scheduling and Run Cutting Software			✓	
Total:	$100,000			

Participants / Resource Sharing

WMATA

City of Alexandria – DASH

Virginia Railway Express

City of Fairfax - CUE

Barriers

Notes: Fixed-Route (Small – 31 vehicles)

Transit Operator: Bay Transit (includes Colonial Beach Transit, New Kent, and Urbanna)

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Projected Deployment (next 6 years)																
●	●	●	○	○	●	○	○	●	○	●	●	●	●	○	○	○
Typical Industry Deployment Path																
●	-	-	-	◐	◐	-	-	-	-	●	●	-	-	-	-	-

Action Plan

Project	Budget (for near-term projects – if known)	Date		
		1-2 yrs	2-6 yrs	6+ yrs
CAD/AVL		✓		
Scheduling and Run Cutting Software		✓		
Maintenance Management Software		✓		
Driver Assignment and Workforce Management System		✓		
Yard Management System		✓		
Automatic Passenger Counters		✓		
Transit Trip Planner		✓		
Automated Stop Announcement / Message Signs			✓	
On-Board Cameras			✓	
Total:	$1,650,000			

Participants / Resource Sharing

Colonial Beach Transit

New Kent

Urbanna

Barriers

KFH Group is currently doing a paratransit software scheduling needs assessment. We expect to be able to then do an RFP to purchase many of the items listed above. Depending on resources available (funding as well as IT staff) we would like to be able to purchase and implement all of the programs above.

Notes: Demand Response (Small – 37 vehicles); validated by Melissa Phillips 2009-05-04

Transit Operator: Blacksburg Transit

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
●	●	●	○	○	◐	○	○	●	○	●	●	●	○	○	○	○
Projected Deployment (next 6 years)																
●	●	●	○	○	◐	●	●	●	○	●	●	●	○	●	●	●
Typical Industry Deployment Path																
●	◐	●	○	◐	◐	◐	◐	◐	○	●	◐	◐	◐	◐	○	○

Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
Next Bus Arrival Display	$20,000	✓		
Real-Time Information on Web (www.bt-tracker.com)	Completed by VT Class	✓		
IVR Phone System	$30,000	✓		
In-Station / Stop Security Camera (at new transfer facilities)			✓	
In-Station / Stop Emergency Alarm (at new transfer facilities)			✓	

Participants / Resource Sharing

Virginia Tech (there is interest in working with other transit operators for senior design projects)

DRPT

Town of Blacksburg

Barriers

Good work being done by Virginia Tech students to develop applications but no continuity when students finish school.

Notes: Fixed-Route (Small – 33 vehicles); validated by Tim Witten 2009-05-11 and in workshop 2009-06-10

Transit Operator: Blackstone Areas Bus, BABS – Brunswick Express

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Projected Deployment (next 6 years)																
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	◐	○
Typical Industry Deployment Path																
●	◐	●	○	◐	◐	◐	◐	◐	○	●	◐	◐	◐	◐	○	○

Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
Security System for Bus Office	$35,000	✓		

Participants / Resource Sharing

Barriers

Lack of funds (Blackstone would like to have many of the ITS technologies listed above, but financing the project is always a problem).

Lack of staff

Notes: Fixed Route (Small – 6 vehicles); validated by Jennifer Beck 2009-05-12

Transit Operator: Bristol Transit

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Projected Deployment (next 6 years)																
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Typical Industry Deployment Path																
●	◐	●	○	◐	◐	◐	◐	◐	○	●	◐	◐	◐	◐	○	○

Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
Future ITS may be anticipated				✓

Participants / Resource Sharing

Bristol Transit of Tennessee

Barriers

Notes: Fixed-Route (Small)

Transit Operator: Charlottesville Transit Service

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
●	○	◐	○	●	●	●	●	○	●	○	○	○	○	●	◐	○
Projected Deployment (next 6 years)																
●	○	◐	○	●	●	●	●	●	●	○	●	○	●	●	◐	○
Typical Industry Deployment Path																
●	◐	●	○	◐	◐	◐	◐	◐	○	●	◐	◐	◐	◐	○	○

Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
Transit Trip Planner		✓		
Maintenance Management Software			✓	
Yard Management System			✓	
Total:	$50,000			

Participants / Resource Sharing

JAUNT

Barriers

Notes: Fixed-Route (Small – 28 vehicles)

Transit Operator: Danville Transit

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Projected Deployment (next 6 years)																
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Typical Industry Deployment Path																
●	◐	●	○	◐	◐	◐	◐	◐	○	●	◐	◐	◐	◐	○	○

Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
Future ITS may be anticipated				✓

Participants / Resource Sharing

Barriers

Notes: Fixed Route (Small – 19 vehicles)

Transit Operator: District Three Public Transit

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Projected Deployment (next 6 years)																
●	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○	○
Typical Industry Deployment Path																
●	◐	●	○	◐	◐	◐	◐	◐	○	●	◐	◐	◐	◐	○	○

Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
CAD/AVL	$225,000	✓		
Scheduling and Run Cutting Software	$5,000	✓		

Participants / Resource Sharing

Barriers

Funding and local match

Notes: Fixed-Route (Small – 46 vehicles); validated by Donna Smith 2009-05-08

Transit Operator: Fairfax County DOT (Fairfax Connector)

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
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Projected Deployment (next 6 years)																
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Typical Industry Deployment Path																
●	●	●	◐	●	●	◐	◐	◐	◐	●	●	●	◐	●	●	◐

Note: Currently using WMATA's trip planner; buses are pre-wired.

Action Plan

(* indicates project may be deployed at earlier date than shown)

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
Maintenance Management Software		✓		
Yard Management System			✓	
Automated Stop Announcement / Message Signs			✓	
Automatic Passenger Counters			✓	
On-Board Cameras			✓	
Security Camera & Emergency Alarm at Storage Facilities			✓	
Next Bus Arrival Display			✓	
Real-Time Information on Web & Mobile Device			✓	
CAD/AVL*			✓	
Total:	$200,000			

Participants / Resource Sharing

City of Alexandria – DASH

City of Fairfax - CUE

Barriers

Notes: Fixed-Route (Medium – 177 vehicles); validated by Bruce Edwards in workshop 2009-06-11

Transit Operator: Fairfax CUE

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
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Projected Deployment (next 6 years)																
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Typical Industry Deployment Path																
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Note: City of Fairfax CUE deploys an AVL system without CAD capabilities

Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
Automatic Passenger Counter			✓	

Participants / Resource Sharing

Fairfax Connector

WMATA

Barriers

Technological challenges in integrating the AVL system with surrounding agency's AVL deployments.

Notes: Fixed-Route (Small – 12 vehicles); validated by Alex Verzosa 2009-04-17.

Transit Operator: Farmville Area Bus

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
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Projected Deployment (next 6 years)																
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Typical Industry Deployment Path																
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Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6y rs	6+ yrs
On-board Cameras	$84,000	✓		

Participants / Resource Sharing

Barriers

On-board camera deployment is contingent on grant money being approved. If not approved this year, then will continue to apply.

Notes: Fixed-Route (Small – 14 vehicles); validated by Julie Adams 2009-05-21

Transit Operator: Four County Transit

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
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Projected Deployment (next 6 years)																
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Typical Industry Deployment Path																
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Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
On-Board Cameras			✓	

Participants / Resource Sharing

Town of Bluefield – Graham Transit

District Three Public Transit

Barriers

Lack of funding for plan

Notes: Fixed-Route (Small – 31 vehicles); form validated by Joe Ratliff 2009-05-04

Transit Operator: Fredericksburg Regional Transit (including FRED Transit)

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
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Projected Deployment (next 6 years)																
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Typical Industry Deployment Path																
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Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
CAD/AVL	$375,000	✓		

Participants / Resource Sharing

FRED Transit - Caroline County

FRED Transit - King George County

Barriers

Notes: Fixed-Route (Small)

Transit Operator: Greater Lynchburg Transit Company

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
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Projected Deployment (next 6 years)																
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Typical Industry Deployment Path																
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Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
Full AVL/CAD with public info	$500,000 - $750,000	✓		
Paratransit with MDT's	$100,000	✓		
Runcutting / operations management (driver management also included)	$81,000	✓		
Next Bus Arrival Display			✓	
Real-Time Information to Info Mobile Devices			✓	
First: analysis/system engineering, possibly phased				

Participants / Resource Sharing

DRPT / FTA

MPO

Liberty University

Barriers

Operational funding (systems fees / upkeep)

Engineering / planning / project management (understaffed)

Notes: Fixed-Route (Small – 29 vehicles); completed in 2009-02-27 workshop & validated by Scott Wilson in 2009-06-10 workshop

Transit Operator: Greater Richmond Transit Company

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
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Projected Deployment (next 6 years)																
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Typical Industry Deployment Path																
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Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
New Paratransit Software / AVL		✓		
New Fleet Maintenance System		✓		
Signal Priority – BRT project			✓	
Yard Management – New facility			✓	
Security Camera – New facility / transfer centre			✓	
Total	$500,000			

Participants / Resource Sharing

Planning

Engineering

Scheduling

Finance

Procurement

Inventory

Barriers

City of Richmond

Reluctance to change

Notes: Fixed-Route (Medium – 156 vehicles); completed in 2009-02-27 workshop

Transit Operator: Greater Roanoke Transit Company

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
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Projected Deployment (next 6 years)																
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Typical Industry Deployment Path																
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Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
CAD/AVL			✓	
Scheduling & Run Cutting Software			✓	
Automatic Passenger Counters			✓	

Participants / Resource Sharing

RADAR

Barriers

Notes: Fixed-Route (Small – 51 vehicles)

Transit Operator: Greene County Transit, Inc.

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
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Projected Deployment (next 6 years)																
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Typical Industry Deployment Path																
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Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
CAD/AVL			✓	
Maintenance Management Software			✓	
Driver Assignment and Workforce Management Systems			✓	
Automated Fare Collection			✓	
Transit Trip Planner			✓	
IVR Phone System			✓	

Participants / Resource Sharing

Barriers

Notes: Demand Response (Small – 14 vehicles); validated by Ginger Morris 2009-05-04

Transit Operator: Hampton Roads Transit

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
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Projected Deployment (next 6 years)																
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Typical Industry Deployment Path																
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Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
Bus Arrival Signs	$150,000 (funded)	✓		
Real Time Web		✓		
Wayside Security Cameras and Alarm		✓		
LRT Transit Signal Priority		✓		
Expand Mobile Device Support				

Participants / Resource Sharing

Local Hampton Roads cities

HR MPO

DRPT

Williamsburg Transit

Barriers

Depth of technical support staff

Dedicate project management staff

Operational funding

Technology refresh

Notes: Fixed-Route (Large – 332 vehicles); completed in 2009-02-27 workshop

Transit Operator: Harrisonburg Department of Public Transportation

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
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Projected Deployment (next 6 years)																
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Typical Industry Deployment Path																
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Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
Automated Stop Announcement / Message Signs		✓		
Automatic Passenger Counters		✓		
Transit Trip Planner		✓		
CAD/AVL			✓	
Scheduling & Run Cutting Software			✓	
In-Station / Stop Security Camera			✓	
Next Bus Arrival Display			✓	
Real-Time Information on Web			✓	
Real-Time Information on Mobile Device			✓	
Total	$340,000			

Participants / Resource Sharing

Barriers

Notes: Fixed-Route (Small – 24 vehicles)

Transit Operator: JAUNT

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
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Projected Deployment (next 6 years)																
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Typical Industry Deployment Path																
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Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
On-Board Cameras, Maintenance system	$500,000	✓		
AFC	$500,000	✓		
Wayside Security	$200,000		✓	
Phased Traveller Info project	~$100,000		✓	

Participants / Resource Sharing

CTS (local fixed route)

National ground intelligence center coming

Barriers

Funding

Lack of in-house staff

Data Mgt. needs – we need very specific reporting specs.

Notes: Demand Response (Large – 69 vehicles); completed in 2009-02-27 workshop

Transit Operator: King Street Trolley

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
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Projected Deployment (next 6 years)																
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Typical Industry Deployment Path																
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Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
Future ITS may be anticipated				✓

Participants / Resource Sharing

Barriers

Notes: Fixed-Route (Small)

Transit Operator: Lake County Area Agency on Aging

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
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Projected Deployment (next 6 years)																
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Typical Industry Deployment Path																
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Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
Future ITS may be anticipated				✓

Participants / Resource Sharing

Barriers

Notes: Demand Response (Small)

Transit Operator: Loudoun County Office of Transportation Services

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
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Projected Deployment (next 6 years)																
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Typical Industry Deployment Path																
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Note: Currently, AFC equipment also serves as APC; and text messages are sent manually. Service at garage is contracted, so contractor provides any driver or yard management systems.

Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
Scheduling and Run Cutting Software	$150,000	✓		
Automated Real-Time Information on Mobile Device		✓		
Real-Time Information on Web			✓	
Automated Stop Announcement / Message Signs			✓	
Next Bus Arrival Display				✓

Participants / Resource Sharing

Virginia Regional Transit

Loudoun County Public Schools - Transportation

Loudoun County Public Information System

Barriers

Financial. Loudoun County financial resources for transit are being used to continue to develop infrastructure ie. Park and ride lots, maintenance and storage facility, etc.

Notes: Commuter Bus; validated by Nancy Gourley 2009-05-04 and in workshop 2009-06-11

Transit Operator: Mountain Empire Older Citizens, Inc.

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
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Projected Deployment (next 6 years)																
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Typical Industry Deployment Path																
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Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
Future ITS may be anticipated				✓

Participants / Resource Sharing

Barriers

Notes: Demand Response (Small – 38)

Transit Operator: Petersburg Area Transit

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
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Projected Deployment (next 6 years)																
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Typical Industry Deployment Path																
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Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
Future ITS may be anticipated				✓

Participants / Resource Sharing

Hampton Roads

Barriers

Notes: Fixed-Route (Small – 17 vehicles)

Transit Operator: Potomac & Rappahannock Transportation Commission (OmniRide)

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
◐	○	◐	○	●	◐	○	○	●	●	●	●	●	○	○	◐	○
Projected Deployment (next 6 years)																
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Typical Industry Deployment Path																
●	○	◐	◐	●	●	●	●	◐	●	◐	◐	◐	○	●	●	○

Note: AVL deployed across full fleet but CAD deployed only on local buses. AVA – electronic sign used by annunciation done manually by driver. On-board cameras deployed on 80% of fleet. Security camera system is at PRTC Transit Center facility.

Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
On-Board Cameras (extend deployment across full fleet and increase functionality of existing system)	$150,000	✓		
CAD/AVL (to replace existing system) – includes automated stop announcement			✓	
Google Trip Planner				✓
Automatic Passenger Counters (on some vehicles)				✓
Real-Time Information (Web, IVR, Next Bus Arrival Display)				✓
Transit Signal Priority				✓

Participants / Resource Sharing

Barriers

Notes: Commuter Bus (79 vehicles at peak)

Transit Operator: Potomac & Rappahannock Transportation Commission (OmniLink)

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
◐	◐	◐	○	●	○	●	○	●	●	●	●	●	○	○	◐	○
Projected Deployment (next 6 years)																
●	◐	◐	○	●	○	●	○	●	●	●	●	●	○	○	◐	○
Typical Industry Deployment Path																
●	-	-	-	◐	◐	○	○	-	○	●	●	○	○	-	-	-

Note: AVA – electronic sign used by annunciation done manually by driver. APC – passenger counts are derived from farebox. Security camera system is at PRTC Transit Center facility.

Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
CAD/AVL (to replace existing system) – includes automated stop announcement			✓	
Google Trip Planner				✓
Real-Time Information (Web, IVR, Next Bus Arrival Display)				✓
Transit Signal Priority				✓

Participants / Resource Sharing

Barriers

Notes: Demand Response (Small)

Transit Operator: Pulaski Area Transit

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Projected Deployment (next 6 years)																
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Typical Industry Deployment Path																
●	◐	●	○	◐	◐	◐	◐	◐	○	●	◐	◐	◐	◐	○	○

Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
Future ITS may be anticipated				✓

Participants / Resource Sharing

Barriers

Notes: Fixed-Route (Small – 7 vehicles)

Transit Operator: RADAR

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
●	○	○	○	○	○	○	○	○	○	●	○	●	○	○	○	○
Projected Deployment (next 6 years)																
●	○	●	○	●	●	○	○	○	○	●	●	●	○	○	○	○
Typical Industry Deployment Path																
●	◐	●	○	◐	◐	◐	◐	◐	○	●	◐	◐	◐	◐	○	○

Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
Maintenance Management Software		✓		
Electronic Destination Signs		✓		
On-Board Cameras		✓		
Automated Fare Collection			✓	
Total	$380,000			

Participants / Resource Sharing

Greater Richmond Transit Company

Barriers

Notes: Fixed-Route (Small – 22 vehicles)

Transit Operator: STAR Transit

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Projected Deployment (next 6 years)																
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Typical Industry Deployment Path																
●	◐	●	○	◐	◐	◐	◐	◐	○	●	◐	◐	◐	◐	○	○

Action Plan

Project	Budget *(for near-term projects – if known)*t	Date		
		1-2 yrs	2-6 yrs	6+ yrs
Future ITS may be anticipated				✓

Participants / Resource Sharing

Hampton Roads

Town of Chincoteague Transit

Barriers

Notes: Fixed-Route (Small – 8 Vehicles)

Transit Operator: Town of Bluefield – Graham Transit

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Projected Deployment (next 6 years)																
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Typical Industry Deployment Path																
●	◐	●	○	◐	◐	◐	◐	◐	○	●	◐	◐	◐	◐	○	○

Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
Future ITS may be anticipated				✓

Participants / Resource Sharing

Bluefield Area Transit (West Virginia)

Four County Transit

Barriers

Notes: Fixed-Route (Small – 4 vehicles)

Transit Operator: Town of Chincoteague

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Projected Deployment (next 6 years)																
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Typical Industry Deployment Path																
●	◐	●	○	◐	◐	◐	◐	◐	○	●	◐	◐	◐	◐	○	○

Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
Future ITS may be anticipated				✓

Participants / Resource Sharing

STAR Transit

Barriers

Notes: Fixed-Route (Small – 2 Vehicles)

Transit Operator: Virginia Railway Express

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
●	○	●	○	◐	○	●	●	●	●	○	●	○	○	●	◐	◐
Projected Deployment (next 6 years)																
●	○	●	○	◐	○	●	●	●	●	○	●	○	○	●	●	●
Typical Industry Deployment Path																
●	◐	●	○	◐	●	●	●	●	◐	●	◐	◐	○	●	●	◐

Notes: AVA – audio in 100% of coaches but message signs in approx. 65%. Trip planner is WMATA's Internet-based trip planner. Security cameras at 5 of 18 stations.

Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
Trip Planner – VRE solution		✓		
Additional cameras at stations			✓	
Total	$100,000			

Participants / Resource Sharing

City of Alexandria – DASH

City of Fairfax – CUE

Fairfax Connector

WMATA

Danville Transit

Barriers

Notes: Passenger Rail; validated by Christine Hoeffner 2009-05-26 and April Maguigad in workshop 2009-06-11

Transit Operator: Virginia Regional Transit

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
○	○	○	○	○	◐	○	○	○	○	●	●	○	○	○	○	○
Projected Deployment (next 6 years)																
●	●	●	○	○	●	●	●	●	●	●	●	○	●	●	●	●
Typical Industry Deployment Path																
●	◐	●	○	◐	◐	◐	◐	◐	○	●	◐	◐	◐	◐	○	○

Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
Yard Management System		✓		
CAD/AVL			✓	
Automated Stop Announcement / Message Signs			✓	
Automatic Passenger Counters			✓	
On-Board Cameras			✓	
In-Station / Stop Security Camera & Emergency Alarm			✓	
Transit Trip Planner			✓	
Next Bus Arrival Display			✓	
Real-Time Information on Web & Mobile Device			✓	
IVR Phone System			✓	
Total	$50,000			

Participants / Resource Sharing

Barriers

Notes: Fixed-Route (Small)

Transit Operator: Williamsburg Area Transport

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
○	○	●	○	●	●	○	○	●	○	○	○	○	○	○	○	○
Projected Deployment (next 6 years)																
●	●	●	○	●	●	●	●	●	●	●	●	●	○	●	●	○
Typical Industry Deployment Path																
●	-	-	-	◐	◐	-	-	-	-	●	●	-	-	-	-	-

Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
CAD/AVL		✓		
Next Bus Arrival Display		✓		
Real-Time Information on Web		✓		
Real-Time Information on Mobile Device			✓	
IVR Phone System			✓	
Scheduling & Run Cutting Software			✓	
Maintenance Management Software			✓	
Driver Assignment and Workforce Management Systems			✓	
Automatic Passenger Counters			✓	
In-Station / Stop Security Camera			✓	
Total	$200,000			

Participants / Resource Sharing

Hampton Roads

Barriers

Note: Demand Response (Small – 8 Vehicles)

Transit Operator: Winchester Transit

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
○	○	○	○	○	●	○	○	●	○	○	●	○	○	○	○	○
Projected Deployment (next 6 years)																
●	●	●	○	○	●	○	○	●	○	●	●	○	○	○	○	○
Typical Industry Deployment Path																
●	◐	●	○	◐	◐	◐	◐	◐	○	●	◐	◐	◐	◐	○	○

Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6 yrs	6+ yrs
Scheduling and Run Cutting Software		✓		
CAD/AVL			✓	
Automated Vehicle Annunciation			✓	
Automatic Passenger Counters			✓	
Total	$300,000			

Participants / Resource Sharing

Virginia Regional Transit

Barriers

Notes: Fixed-Route (Small – 10 vehicles); validated by Renee Wells 2009-05-12

Transit Operator: WMATA

Program Description

On-Board Equipment						Central System Equipment								Wayside Equipment		
CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Existing Deployment																
●	◐	●	◐	●	◐	●	●	●	●	●	●	●	●	○	●	●
Projected Deployment (next 6 years)																
●	◐	●	◐	●	◐	●	●	●	●	●	●	●	●	●	●	●
Typical Industry Deployment Path																
●	●	●	●	●	●	●	●	●	●	●	●	●	◐	●	●	◐

Action Plan

Project	Budget *(for near-term projects – if known)*	Date		
		1-2 yrs	2-6yrs	6+ yrs
Next Bus Arrival Display	$300,000 (assuming deployment of 30 signs)	✓		
Parking Guidance System Pilot	$1.5 million	✓		
Neutral Host (phone carriers in tunnels)			✓	
Metro Chanel			✓	
Regional ITS Integration Stack			✓	
Next Generation Bus Info (standardize AVL)			✓	
Capital Planning Decision Making				✓

Participants / Resource Sharing

City of Alexandria - DASH

RITIS

Local bus providers

Local public safety and first responders

Barriers

Leadership gaps both internally and region-wide

Internal culture / stove pipes

Notes: Fixed-Route (Large – 1,433 vehicles); validated by Sean Kennedy 2009-05-15